SEISMIC AND SAFETY

CITY OF LODI
CALIFORNIA

GENERAL PLAN
1977

SAFETY ELEMENTS

PREPARED BY COMMUNITY DEVELOPMENT DEPARTMENT

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SAFETY/SEISMIC SAFETY ELEMENT

OF THE

LODI CITY GENERAL PLAN

PREPARED BY

City of Lodi Community Development Department

RECOMMENDED FOR ADOPTION JUNE 23, 1980
Lodi City Planning Commission

ADOPTED AUGUST 20, 1980
Lodi City Council Ordinance 1210

ACKNOWLEDGEMENTS

Significant portions of this Element have been extracted from the Safety/Seismic Safety Element of the San Joaquin County General Plan, and the Safety and Seismic Safety Elements of the General Plan of the San Joaquin County Council of Governments. These sources are acknowledged in the text with bibliographic references (1), (3) and (43).

The assistance of the staff of the County Planning Department and the COG staff greatly facilitated the preparation of this Element. Their support and cooperation is sincerely appreciated.

BIBLIOGRAPHIC REFERENCES

In the text, numbers in parenthesis ( ) indicate that a specific reference is cited. These numbers correspond to the numbers in the bibliography at the back of this Element.

GLOSSARY

To assist the reader in understanding the terms used in this Element, a glossary is included as Appendix C, beginning on page 137.

FILE REFERENCES

Community Development Department files:

General Plan Element - Safety/Seismic Safety Element
General Plan Element - Safety/Seismic Safety Element - Implementation
Negative Declaration - ND 80-7

City Clerk Files:

Ordinance 1210 - August 20, 1980

State Clearinghouse Number: 8003311

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GOAL
OBJECTIVES
PURPOSE

It is **THE GOAL** of the City of Lodi...

to identify natural and manmade hazards which may threaten the life and property of the people of Lodi, and to achieve acceptable levels of protection.

OBJECTIVES

It is the objective of the City of Lodi, through this General Plan Element to:

- Identify existing and potential hazards to the public safety;
- Describe the potential risk;
- Determine acceptable levels of risk and protection;
- Minimize the adverse economic, social, and physical impacts from safety hazards and emergency situations;
- Ensure compatibility among land uses where hazards are involved;
- Identify problems and possible solutions in the provision of protective and emergency services;
- Delineate means by which public safety considerations will be incorporated into public and private agency functions.

Chapter 1

THE SAFETY/SEISMIC SAFETY ELEMENT

PURPOSE AND SCOPE

The purpose of the Safety/Seismic Safety Element of the General Plan is to bring safety considerations into focus in land use planning in order to reduce loss of life, injuries, damage to property and economic and social dislocation. This is accomplished through an analysis of hazards, an evaluation of risk to life and property, policies for hazard mitigation, and implementation measures. It is also the purpose of this Element to apprise people of potential hazards, in order that reasonable "Levels of Acceptable Risk" may be defined. "Acceptable Risk" is discussed below. Because the Safety and Seismic Safety Elements are so closely related, they are presented as a single document, representing two of the nine mandatory Elements of the General Plan. The combined Element considers seismic and geologic occurrences, flood, fire, crime, and other miscellaneous hazards.

The chapters of this Element are organized by subject, with the informational text material preceded by specific assumptions, the policies, and implementation measures. The policies, adopted by the City Council are the basis for City decisions and actions, and in part define an "Acceptable Level of Risk."

The policies adopted as part of the Safety/Seismic Safety Element are not intended to remove all risks or to remove all hazards. They are designed to reduce risks to life and property from certain hazards, and will, when implemented, provide a greater degree of safety in case of a disaster.

LEGAL FRAMEWORK

California Government Code Section 65302(f) requires a Seismic Safety Element in all city and county general plans:

> "A seismic safety element consisting of an identification and appraisal of seismic hazards such as susceptibility to surface ruptures from faulting, to ground shaking, to ground failures, or to the effects of seismically induced waves such as tsunamis and seiches.
>
> "The seismic safety element shall also include an appraisal of mudslides, landslides and slope stability as necessary geologic hazards that must be considered simultaneously with other hazards such as possible surface rupture from faulting, ground shaking, ground failure and seismically induced waves."

Government Code Section 65302(i) requires a Safety Element in all city and county general plans:

> "A safety element for the protection of the community from fires and geologic hazards including features necessary for such protection as evacuation routes, peak load water supply requirements, minimum road widths, clearances around structures, and geologic hazard mapping in areas of known geologic hazard."

ACCEPTABLE RISK-HOW SAFE IS SAFE ENOUGH?

Risk involves both awareness and choice: the voluntary taking of a certain degree of chance. Generally, it falls upon government to take the responsibility to educate the public as to the risks involved in the surrounding environment, to minimize the risk, and to protect the public safety.

A crucial question that hazard reduction programs must answer is "how safe is safe enough?" Since it is impossible or often undesirable to remove all risks in the environment, it is important to define the level of risk at which no action to alleviate that risk is deemed necessary. Acceptable risks are perceivable risks to life and property that are tolerated due to technological limitations, limited resources or conflicting priorities. Unacceptable risks are perceivable risks that must be reduced through ongoing action programs.

People or communities faced with different hazards define where the line between acceptable and unacceptable risks lies and make decisions to reduce a hazard based on a) their perception of the hazard, b) the range of choices open to them, and c) the economic viability and efficiency of the alternatives. Then, through various programs, they reduce the hazard to an acceptable level, or increase the acceptable level to include the hazard.

ASSUMPTIONS
POLICY
IMPLEMENTATION
ANALYSIS

Chapter 2

FLOOD HAZARDS

The Principles and Implementation of this Chapter are based on the following

ASSUMPTIONS

The City of Lodi assumes that:

- Flooding cannot be completely prevented;
- The City of Lodi is subject to flooding, and will be affected by flooding in neighboring areas;
- The possibility of inundation as a result of dam failure exists. However, it is believed at this time to be of low probability. If there is a dam failure, flood water heights are expected to be 1 to 2 feet within 4 to 6 hours, depending on which structure fails;
- The 15,000 cfs flow in the Mokelumne River will be contained within the Mokelumne River Floodway System as identified on the 1978 Flood Hazard Maps prepared for the Federal Insurance Administration;
- The 100 Year Flood flow of the Mokelumne River at CCTRR is estimated to be 8,500 cfs and 8,100 cfs of Woodbridge Dam with an average channel velocity of 2 to 4 feet per second. The flow is expected to be contained within the above defined floodway of the Mokelumne River at Lodi;
- Water depths at the White Slough Treatment Plant are expected to be about one foot during a 100 Year Flood. The depth of water in case of levee failure is not known; however, it is assumed that water levels will not reach the vent elevations on the electrical system transformers, or overtop the ponding levees or walls;
- The 500 Year Flood flow of the Mokelumne River is estimated to be 48,000 cfs just downstream of Camanche Dam, 44,000 cfs at CCTRR and 30,000 cfs at Woodbridge Dam,[1] with an average channel velocity of 4 to 6 feet per second, which will cause areas of Lodi to be flooded to a depth of 3 feet;
- The probability of flooding, within the City of Lodi, outside of the designated floodway of the Mokelumne River, is very low.

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[1] Flows obtained from Nov. 1979 proof copy of Flood Insurance Study for San Joaquin County, California, unincorporated areas, p. 41.

The City of Lodi adopts the following

POLICIES

- Only water dependent structures will be permitted in the floodway.
- The City of Lodi will monitor and regulate all land use activities in the floodplain.
- The City of Lodi shall continue to participate in the National Flood Insurance Program in order to maintain the availability of flood insurance and decrease the potential for financial loss.
- The City will promote ongoing monitoring programs of all upstream dams and continued evaluation and enforcement of dam safety requirements.
- Whenever there is new information about the possibility of dam failure the City of Lodi will review all pertinent policies and implementation programs and revise where necessary.
- All City-owned structures and facilities which can be adversely affected by floodwaters should be flood proofed if they are located in 100 Year Flood areas or areas subject to flooding as a result of levee failure.
- The City will support and encourage efforts to clean the Mokelumne River Channel to maintain flood carrying capacity only if necessary, and if consistent with City and County policies for conservation of land and aquatic habitat and vegetation.
- Developed and developing areas of the City will be served by a drainage system adequate to store runoff generated by a 100 Year Storm.
- The City will not encourage or facilitate land uses or projects which have the potential of greatly increasing flood hazards, or cause potential damage in case of flooding.
- The City will obtain flood hazard reports whenever there are any changes along the Mokelumne River within the City which may have an effect on 1980 floodplain information.
- Whenever feasible the City will coordinate planning and enforcement activities in the floodplain.
- The City of Lodi will make people aware of existing and potential flood hazards and the level of risk considered to be acceptable.

- The degree of flood protection and damage reduction measures to be taken by the City of Lodi will be commensurate with the degree of acceptable risk and acceptable level of potential damage as determined by the Council.
- The City of Lodi will support implementation of flood hazard reduction measures in neighboring areas.
- In seeking alternative electrical power sources, the City will evaluate the system's capability of supplying power during floods.
- Based on the low probability of flooding, flood hazard considerations in land use planning, development and construction within the City of Lodi are, and will be, given a low priority, except along the Mokelumne River.

Based on the adopted policies, the City of Lodi will pursue the following

IMPLEMENTATION MEASURES

- Regular and emergency maintenance of drainage systems.
- Identification of structures adequate for temporary holding of those individuals unable to be evacuated during flooding, and inclusion of this list in appropriate Emergency Plans.
- Inclusion of flood hazards in police and fire department procedural and policy manuals, consistent with Emergency Plan provisions.
- Prepare a summary of the Safety-Seismic Safety Element or other informational brochure for public distribution.
- Inventory all stored items and equipment housed in basements of City buildings and evaluate the risk of loss or damage as a result of flooding in relation to other hazards. Floodproof or move items as determined to be necessary by the appropriate department or office of the City Manager.
- Regular inspection and maintenance of City operated and maintained on-site drainage systems to decrease the possibility of flooding within buildings.
- Sizing of new systems to adequately drain buildings and other areas during periods of intense and/or prolonged rainfall. Systems to be gravity-flow wherever feasible.
- Installation of reliable 'gates' on all drainage outfalls.
- Periodic review of the Floodplain zone and updating when necessary.
- Contribute to the ongoing development of the evacuation plan and oversee its dissemination to the public.

A DISCUSSION ON

FLOOD HAZARDS

AFFECTING THE CITY OF LODI

CHARACTERISTICS OF FLOODING

A flood is a temporary rise in a watercourse flow, or an alteration of watercourse boundaries, that results in water overtopping or breaching its banks or levees and inundating areas adjacent to the normal channel. Floods have been viewed as erratic forces of nature dependent on the unpredictability of rainfall and snowfall. The rivers and floodplains were formed by nature as drainage channels for flood flows resulting from heavy snowmelt or rainfall. (1)

Lodi is in the historical floodplain of the Mokelumne River, which continues to pose a threat of inundation to the City and surrounding area.

Flood characteristics of the Mokelumne River Basin, occurring during late fall and winter (November through April) are primarily the result of intense rainfall, while those which occur during the Spring and early Summer are generally the result of snowmelt. Rainfloods in the Mokelumne River Basin, are similar to those of other Sierra Nevada streams and are characterized by high peak flows, with relatively small volumes, whereas, snowmelt floods are characterized by moderate peak flows with relatively large total volumes. Although rains occur occasionally during the snowmelt season, they do not affect the snowmelt flows significantly. (4)

Exhibit 1

FACTORS INFLUENCING FLOODING (2)

Natural	Manmade
accumulated snow and its moisture content	land uses
rate of snowmelt	changes in drainage
temperature	reservoir capacity
amount, timing, and duration of rains	reservoir releases
month of the year	changes in watercourses
topography	paving of surface areas
soils and geology	levee height
drainage and patterns	levee design and stability
sediment deposition	storm system design
capacities of watercourses	

Flood hazards in Lodi are the result of either extremes of the hydrological cycle, such as intense rain, snowmelt and cloudbursts, or failure of a hydrological control structure such as dam failure, levee failure, or blockage of drainage channels. (1)

The effects of each of these flood hazards on the City of Lodi, and various types of hazard reduction measures are discussed on the following pages.

Floods have always existed; however, they have caused damage only when man settled in floodplain areas. (1)

The amount and extent of damages caused by any flood depends on the topography of the area flooded, depth and duration of flooding, velocity of flow and developments in the floodplain.

A flood can cause destruction in a variety of ways. The initial force of flood waters can shatter structures and uplift vehicles, thus clearing a path in its wake. The movement of the waters can carry objects of large proportions downstream and exert a lateral force, becoming battering rams against stationary structures. Saturation of materials and earth can cause instability, collapse and damage. Floodwaters pick up soils and sediment and through the redeposit of sediment, objects can be buried. Floods cause drowning or isolation of persons and animals. Floodwaters can break utility lines such as telephone, electric, gas, water and sewer lines, indirectly affecting the health of individuals, and directly affecting their safety. The combinations of these effects are the devastative primary effects of floods, whether it is high velocity or sheet flow. (1)

The secondary effects of floods are attributable to standing water, and include damage to, or hazard from electrical circuits, telephone lines, roads and structural foundations, increased risk of drowning, limited vehicular access (including maintenance, rescue, police, fire and ambulance), health hazards including possible well contamination, vector problems and disease, and extreme inconvenience. (1)

Floods in the Mokelumne River basin have caused extensive damage to agricultural areas and considerable damage to the community of Woodbridge. Floods larger than those that have occurred in the past could cause damage to the urban area of Lodi; however, the threat of flooding has been greatly reduced by Camanche Dam and Reservoir.

FLOOD LEVELS AND HISTORICAL FLOODING IN LODI

Floods along a single watercourse are compared in terms of their frequency of occurrence, which is indirectly related to the discharge. Rainfall and snowmelt floods are often referred to as 10 year, 20 year, 50 year, 100 year and 500 year floods. A 10 year flood means that the flood with a given magnitude or greater has a 10% probality of occurring in any year. If a watercourse has been improved to 50 year protection, it will safely contain up to a 50 year flood, but little if any discharge over the 50 year amount.(1) Streamflow records on the Mokelumne River go back to 1904 when the foothill gauging station near Clements (now known as "Mokelumne River Below Camanche Dam" gauge) was established. Major floods during this century have occurred in March, 1907; January, 1909; January, 1914; January, 1921;

February, 1925; March, 1928; November, 1950; December, 1950; December, 1955; and in 1958. The largest of these floods was the November, 1950 flood with a peak flow of about 28,800 cubic feet per second at the "Mokelumne River Below Camanche Dam" gauge, and with a peak flow of about 27,000 cubic feet per second at the "Mokelumne River at Woodbridge" gauge. (4,5) The November, 1977 Flood Insurance Administration, "Flood Insurance Study, San Joaquin County Unincorporated Area" estimates the 1950 and 1955 flows in the Mokelumne River to have been 20 Year Floods. (11) At that time, and in 1958, flashboards were installed along the eastern edge of Lodi Lake, and Turner Road in that area was sandbagged. Water did come out of manholes as a result of backup in the drainage system and portions of Ham Lane and Mills Street were inundated, as was nearly all of Woodbridge. (6, 12, 13, 14)

Camanche Dam has had a significant effect on downstream flooding. At present, a flow of approximately 15,000 cubic feet per second will be contained within the Mokelumne River floodway system. This flow is expected to occur less frequently than once in 100 years on the average. Flows larger than this would inundate areas of Lodi and Woodbridge. The 100 Year Flood flow of the Mokelumne River at Lodi is now estimated to be 9,500 cubic feet/second (cfs) at CCTRR which is a substantial reduction in uncontrolled flow as a result of Camanche Dam and Reservoir. (4,5)

Based on the information available, it appears that a 100 Year Flood in northern San Joaquin County has not been recorded.

THE 100 AND 500 YEAR FLOODS

Discussions of future floods on the Mokelumne River are limited to those designated as the 100 Year Flood and the larger Standard Project Flood. Their selection was based on hydrologic computations (which include analysis of records of past floods) and consideration of pertinent meteorologic and physiographic conditions.

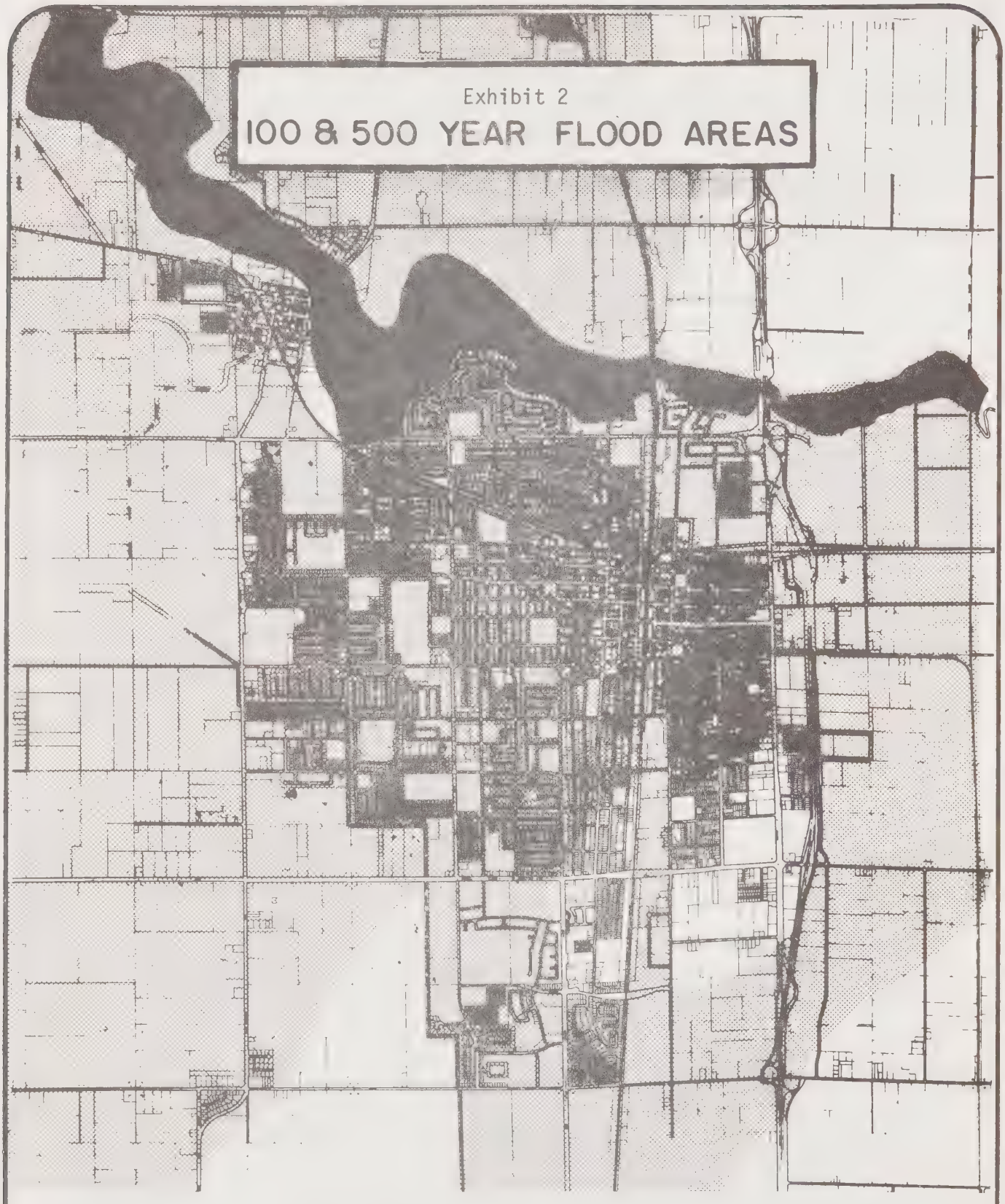
The 100 Year Flood is a flood that will occur once in about 100 years on the average although it may occur in any year. Its estimated peak flow of 9,500 cubic feet per second below Camanche Dam is based on reservoir operation studies and statistical analysis of streamflow records and the rainfall and runoff characteristics of the region in which the Mokelumne River basin is located. This estimated peak flow resulting from a severe combination of reservoir releases and flood flows originating in the downstream tributary area comprises the 100 Year Flood. ( ) The average channel velocities would be approximately 2 to 4 feet per second. (5)

The Standard Project Storm is the most severe combination of meteorological conditions reasonably characteristic of the geographical region, excluding extremely rare combinations. For the purpose of determining the Standard Project Flood (or 500 Year Flood)[1], standard project storms and concurrent rainstorm data were developed for the areas upstream and downstream from

[1]For the Mokelumne River only, the Standard Project Flood is equivalent to the 500 Year Flood.

Exhibit 2

100 & 500 YEAR FLOOD AREAS



100 YEAR FLOOD AREA

500 YEAR FLOOD AREA

Prepared by the Lodi Community Development Department, May, 1980 from the Federal Insurance Administration Rate Maps. 100 Year Flood Area within the City Limits is from City of Lodi Maps (Firm May 15, 1980) Remainder of the 100 Year Flood Area, and the 500 Year Flood Area from the San Joaquin County Flood Insurance Rate Work Map, July, 1977.

the reservoirs. Past floods and other pertinent data were analyzed to determine loss rates (i.e. reduction in amount of runoff through absorption in the ground, diversions, or other factors), which were applied to standard project and concurrent storm runoff. The estimated peak flow of 48,000 cubic feet per second for the Standard Project Flood, results from the most severe combination of reservoir releases and tributary streamflow likely to occur (standard project storm above Camanche Reservoir and concurrent storm below).

Those portions of Lodi and surrounding area that are subject to inundation from a 100 Year Flood and Standard Project Flood (500 Year Flood) are shown on Exhibit 2. An occurrence of the 100 Year Flood would result in some flooding of Lodi Lake Municipal park, Woodbridge Golf and Country Club, Rivergate-Mokelumne Subdivision and associated floodplain areas of the Mokelumne River. Water depths in these areas would be to about one foot. (5)

In the event of the Standard Project Flood, containment of the river is not possible in several reaches along the intermittent levee system and high ground. Overflow north of the River will eventually return to the river several miles downstream. Overflow on the south side of the River will move in a southwesterly direction, towards the San Joaquin River, flooding Lodi and Woodbridge. Duration of this uncontrolled flooding would last approximately 3 days with variations in depth of 0 to 3 feet, averaging about one foot in Lodi and 2 feet in the agricultural areas north of the Mokelumne River. The average channel velocities would be approximately 4 to 6 feet per second.

The City's White Slough Water Pollution Control Facility is within the 100 Year Flood Area as shown on Exhibit 3. The projected depth of flood waters is 6 inches to one foot. Plant structures and ponds on approximately 100 acres that is annexed to the City of Lodi have been constructed to prevent inundation in case of the 100 Year Flood and in case of overtopping or breaching of Delta levees. The remaining 660 acres of the City site is agricultural land used for effluent disposal and would not be adversely affected by floodwaters in the long term. White Slough is served by two power systems each coming from a separate source. Failure of the primary system will automatically activate the secondary source. Electrical transformers are not elevated; however, they are waterproof with vent holes above the anticipated levels of water.

INUNDATION DUE TO STRUCTURAL FAILURES

Dams

All, or portions of the City of Lodi may be inundated as a result of structural failures, specifically failure of upstream dams or dikes.

As stated in the County Safety Element, the thought of a wall of water traveling at devastating speed from a ruptured dam upstream is frightening. Despite the number of dams near the City of Lodi; however, the risk of dam failure causing inundation of portions of Lodi, and San Joaquin County, is

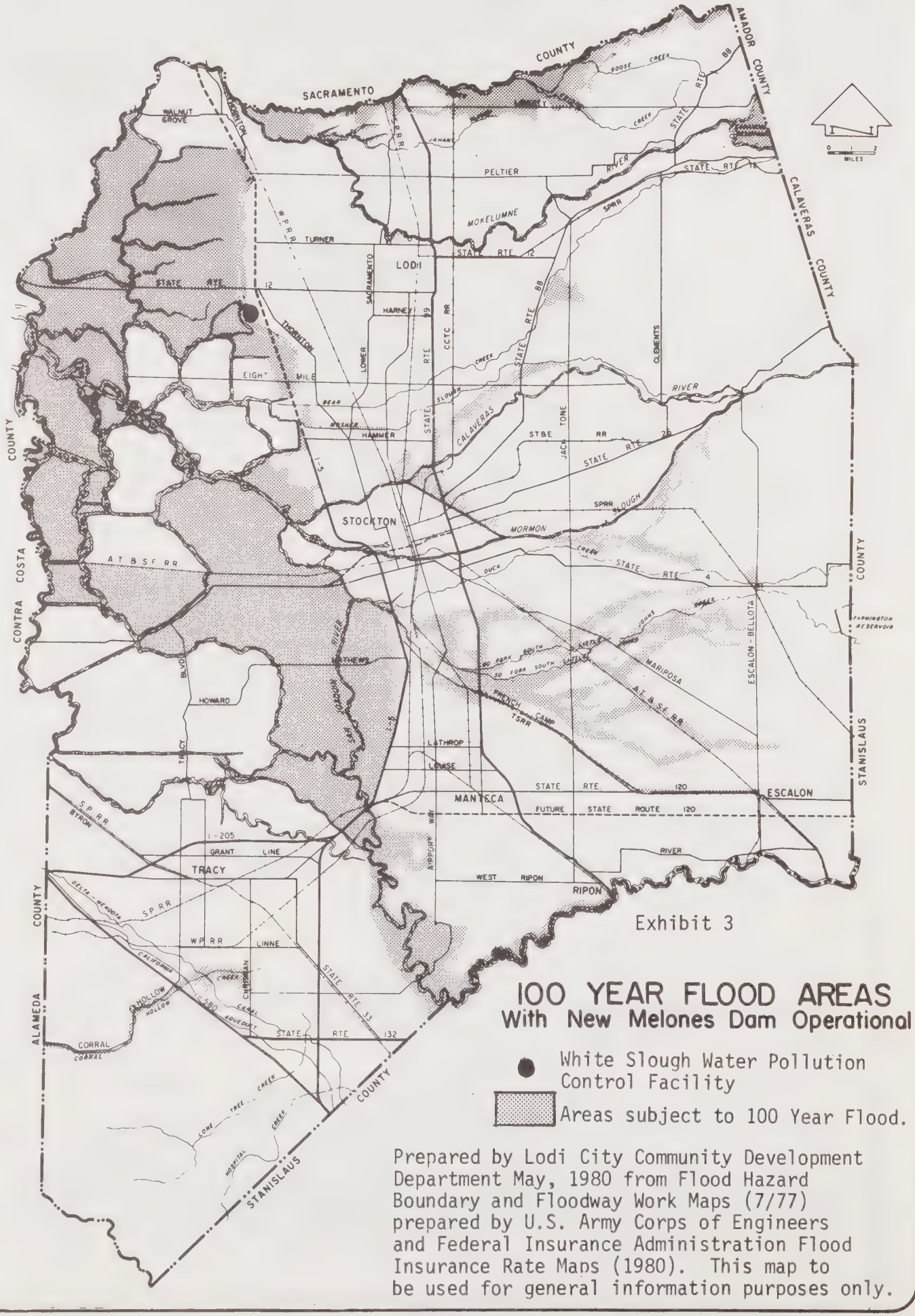


Exhibit 3

100 YEAR FLOOD AREAS
With New Melones Dam Operational

● White Slough Water Pollution Control Facility

▒ Areas subject to 100 Year Flood.

Prepared by Lodi City Community Development Department May, 1980 from Flood Hazard Boundary and Floodway Work Maps (7/77) prepared by U.S. Army Corps of Engineers and Federal Insurance Administration Flood Insurance Rate Maps (1980). This map to be used for general information purposes only.

considered very low, though the degree and nature of risk for each dam is unknown at this time. (1)

A dam failure can occur under three general conditions: as the result of an earthquake; as an isolated incident due to structural instability; or in time of heavy rain in excess of design capacity. (1)

In August, 1972, the Governor approved Senate Bill 896, an Act to add Section 8589.5 to the Government Code relating to dam safety. The amended Dam Safety Act requires that dam owners submit inundation maps to the California Office of Emergency Services for those dams whose total failure would cause loss of life or personal injury. This Act also requires local jurisdictions to adopt emergency procedures for the evacuation and control of populated areas below such dams. (1, 17)

The County's Office of Emergency Services has prepared a Dam Evacuation Plan which includes a description of dams, direction of flood waters, responsibilities and actions of individual jurisdictions, and evacuation plans. Those portions of the plan affecting the City of Lodi are described below and in Exhibit 4. Additional information is in the section on problem mitigation, pages 21-27.

Camanche Dam is an earth and rock-filled dam which represents a significant hazard to the City of Lodi if it should fail. Inundation maps prepared by East Bay Municipal Utility District (Exhibits 5,6,7 and 8) show the extent to which Lodi could be flooded. The depths and velocities of water in Lodi, as a result of dam failure are currently being revised. The 1976 figures reported water depths up to 25 feet in Lodi; however, preliminary information at this time indicates a drastic reduction in the anticipated depths. Some concern regarding the structural integrity of portions of the dam during an earthquake has been expressed. Pertinent investigations are currently underway. Exhibit 4 provides a summary of dam failure data for Camanche and Pardee Dams. Descriptions have not been completed for Salt Springs Reservoir. (17)

Levees

The probability of extensive flooding in the City of Lodi as a result of levee failure (excluding failure as a result of inundation due to a dam break) is very low. The 100 Year Flood is expected to be contained within the area shown on Exhibit 2. The anticipated water level is below the top of the levee, and the height of the retaining wall at Lodi Lake. The levees, east from about Woodbridge Cemetery, are maintained by the City Parks and Recreation Department; however, maintenance consists almost entirely of controlling vegetation and tending the grass.

Levee failure in the Delta is not expected to have a direct flooding effect on the City; however, there may be indirect effects as described on page 27 Delta levee failure can be expected in the case of dam failure, even if

Exhibit 4

MOKELUMNE RIVER DAM FAILURE DATA

	CAMANCHE	CAMANCHE SOUTH DIKE	CAMANCHE NORTH DIKE	PARDEE
EXHIBIT NO.	5	6	7	8
Location, County	San Joaquin	San Joaquin	Calaveras	Amador
Dam Type	Earth & Gravel Fill	Earth & Gravel Fill	Earth & Gravel Fill	Gravel
Acre Feet Storage	431,000	230,978	200,522	210,000
Owner	East Bay M.U.D.	East Bay M.U.D.	East Bay M.U.D.	East Bay M.U.D.
Area Affected	Clements	Clements Bridge/Hwy 12	Clements Bridge/Hwy 88	Mackville Rd. & River
Time Depth Velocity	40 min. 5' to 6' 7 ft/sec	40 min. Elev.141' 5 ft/sec	45 min. Elev. 106' 5 ft/sec.	45 min. Bridge Overtopped 6 ft/sec
Area Affected	Victor	Victor	Bruella Road Bridge	Victor
Time Depth Velocity	1 hr 50 min. 5' to 6' 4 ft/sec	3 hrs 15 min < 1' 3 ft/sec	3 hrs Elev. 65' 4 ft/sec	2 hrs 20 min. < 1 ft. 4 ft/sec
Area Affected	W. Lodi	W. Lodi	W. Lodi	Central Lodi
Time Depth Velocity	4 hrs 1' ± 2 ft/sec	6 hrs 40 min < 1' 1 ft/sec	4 hrs 40 min < 1' 1 ft/sec	4 hrs 20 min < 2' 1.5 ft/sec
# People Threatened	210,600	99,800	36,200	
# Mass Care Centers Required	422	200	73	
#Threatened Unique Institutions	87	58	56	
Evacuation Control Center	County EOC	County EOC	County EOC	County EOC
Lodi Area Evacuation Routes		S. on 99 & Hutchins	S. on 99, W.Ln,Thornton	
No. 8 Mile Road	N. on 99, Lwr.Sac,I-5			
So. 8 Mile Road	S.on 99, L.Ln, I-5			
Woodbridge		S. on I-5		

Note: Times based on E.B.M.U.D. analysis of Teton Dam failure inundated data from USGS.

SOURCE:
1. Safety-Seismic Safety Element, San Joaquin County Planning Department, 1978
2. County and Cities Dam Failure Evacuation Plan, San Joaquin County Office of Emergency Services, 1977, 1978.
3. Fact Sheets prepared by E.B.M.U.D., accompanying letter of 2/28/80 to Cleo Janiw, County Office of Emergency Services.

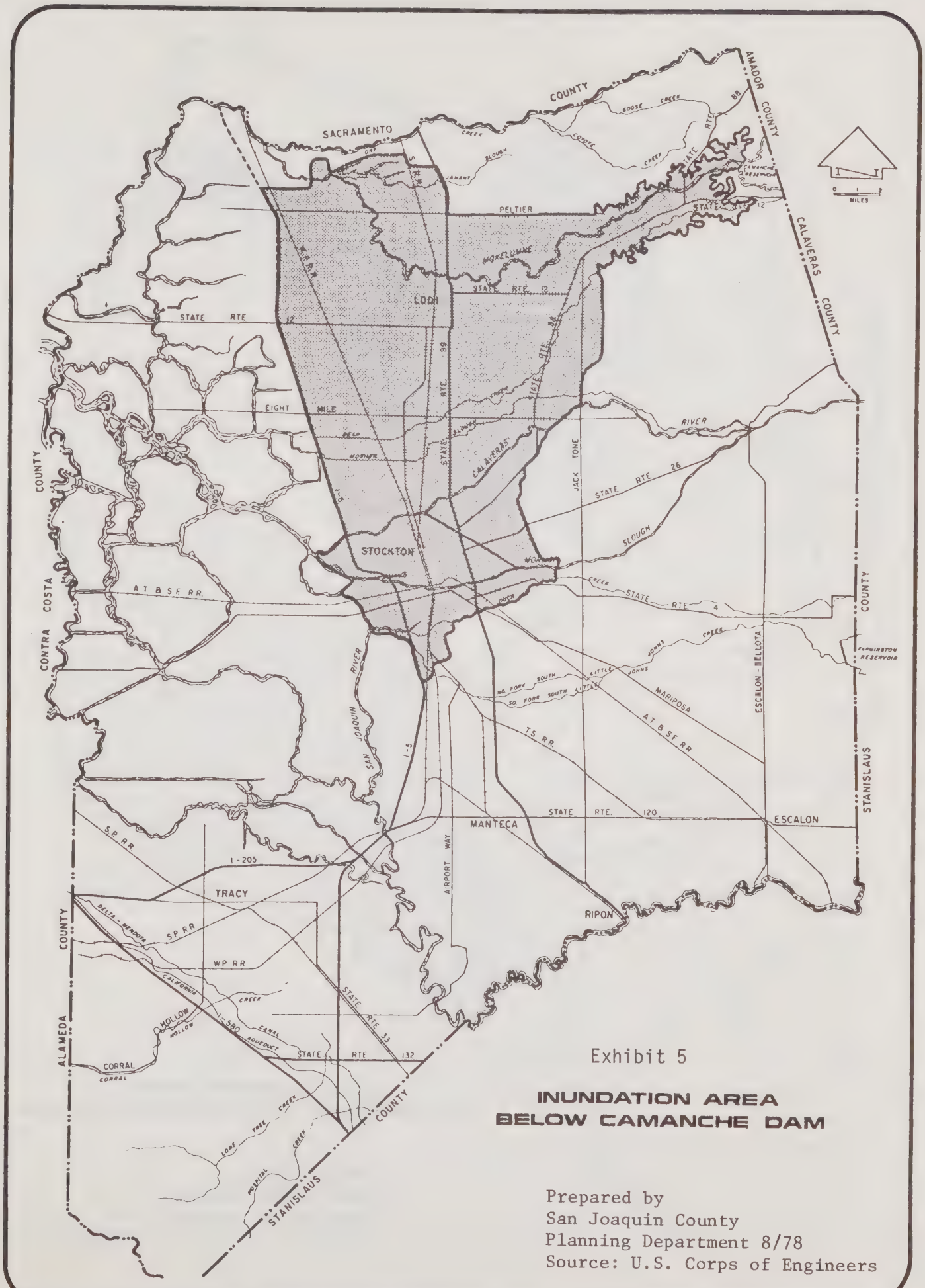


Exhibit 5

INUNDATION AREA BELOW CAMANCHE DAM

Prepared by
San Joaquin County
Planning Department 8/78
Source: U.S. Corps of Engineers

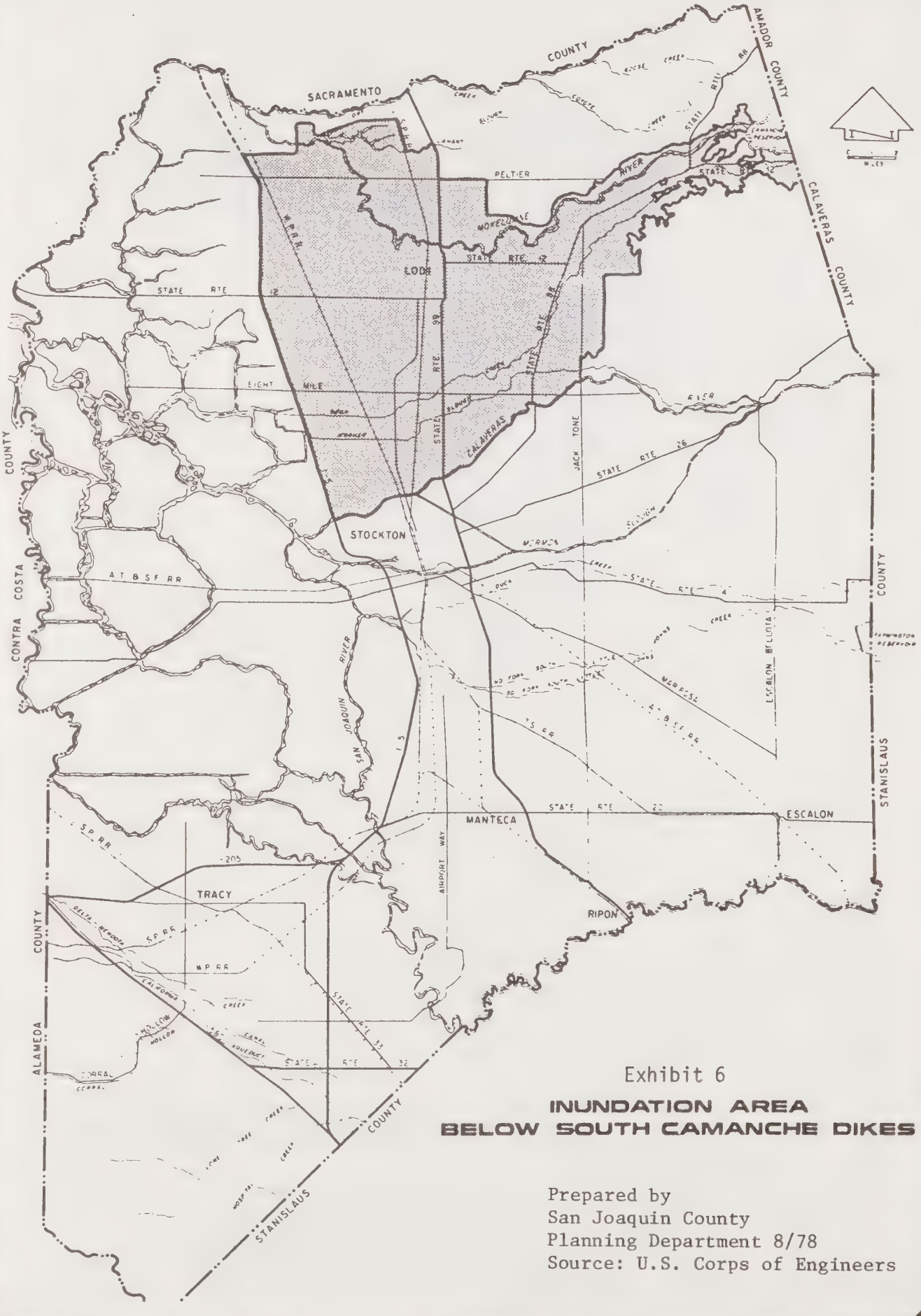


Exhibit 6

INUNDATION AREA
BELOW SOUTH CAMANCHE DIKES

Prepared by
San Joaquin County
Planning Department 8/78
Source: U.S. Corps of Engineers

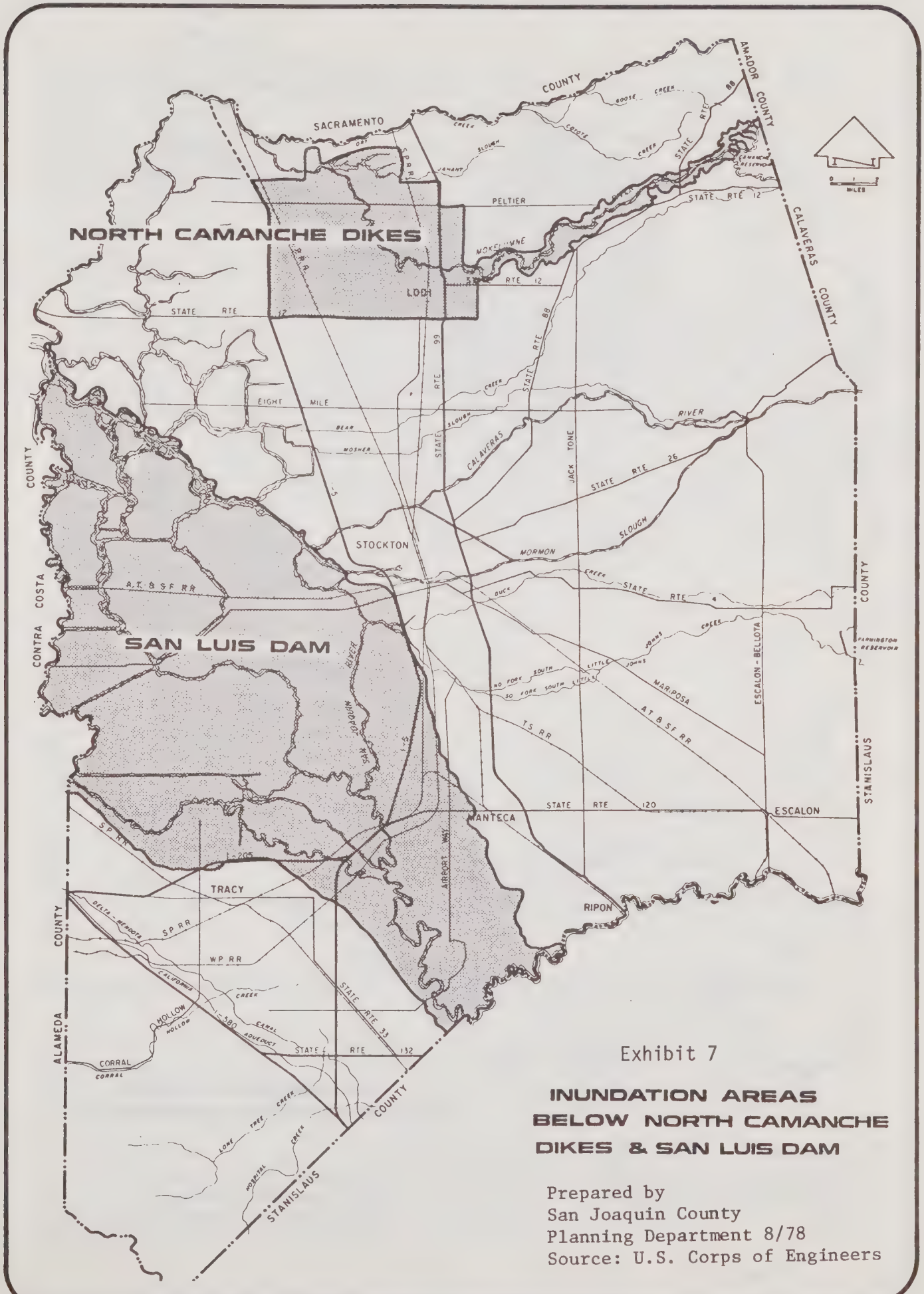


Exhibit 7

INUNDATION AREAS BELOW NORTH CAMANCHE DIKES & SAN LUIS DAM

Prepared by
San Joaquin County
Planning Department 8/78
Source: U.S. Corps of Engineers

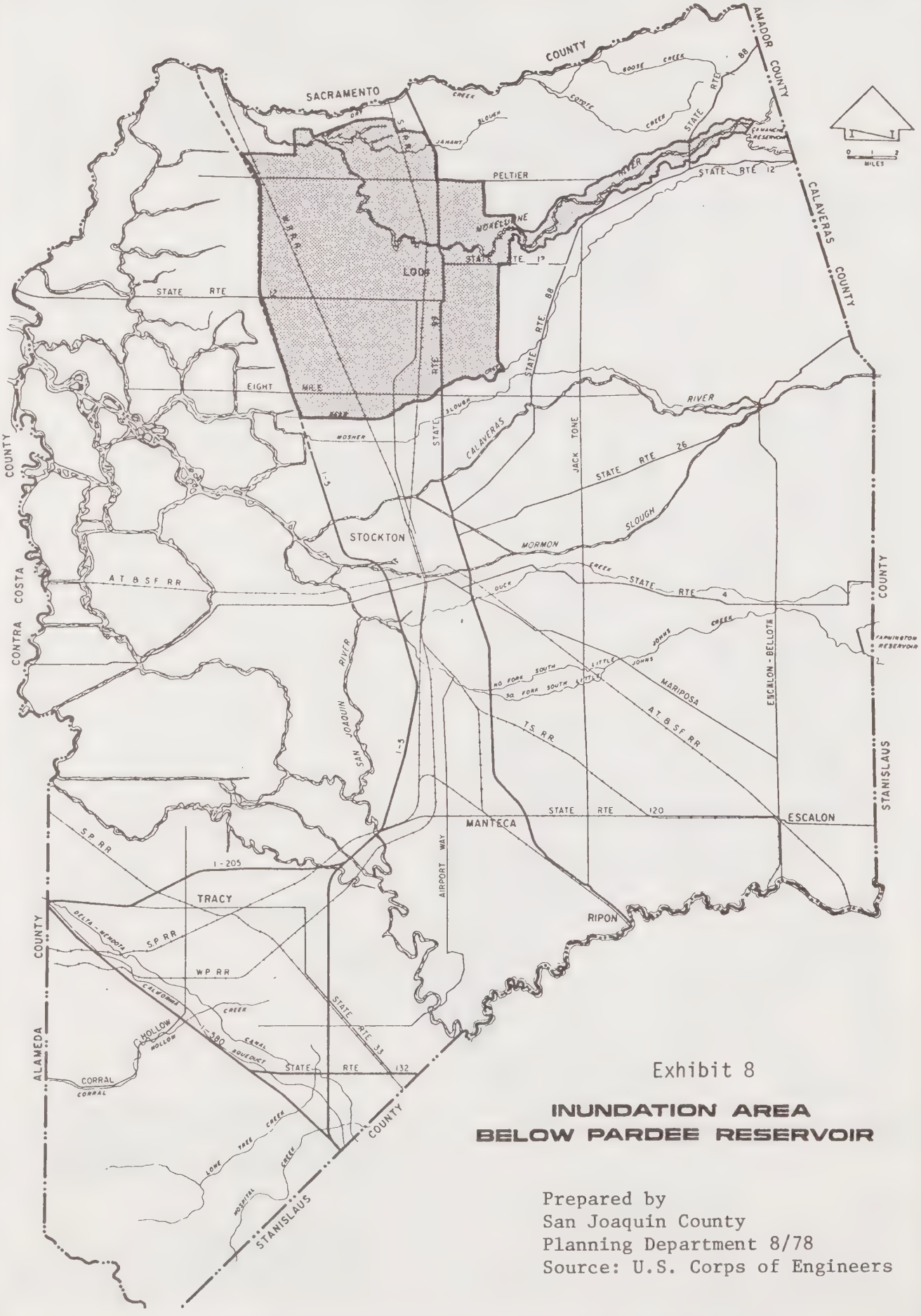


Exhibit 8

INUNDATION AREA BELOW PARDEE RESERVOIR

Prepared by
San Joaquin County
Planning Department 8/78
Source: U.S. Corps of Engineers

not in the projected inundation area, as the large volumes of water drain to San Francisco Bay through the normal channels. The City's White Slough Treatment Plant is protected from inundation if one or more of the deteriorating Delta levees in the vicinity of the plant is overtopped or breached. Deteriorating levees are identified by the U.S. Army Corps of Engineers on a May, 1966 map contained in the San Joaquin County Safety-Seismic Safety Element.

Channel Obstructions

Obstructions to flood flow are both natural and manmade. Natural obstructions include trees and other vegetation growing along the streambanks and floodway areas. Manmade obstructions in the floodplain of the Mokelumne River include the Woodbridge Irrigation Diversion Dam and the four highway and railroad bridges crossing the Mokelumne River. During any potential flood, and each fall, per a pre-Camanche, 1935 operating policy, the flashboards are removed from the Woodbridge Irrigation Diversion Dam, but the structural frames and abutments remain. Any of the manmade obstructions and some of the natural obstructions such as trees, for example, can collect floating debris and thereby create a greater flood hazard due to the higher depths (backwater effect) upstream of these areas. Since the amount of debris is an indeterminate factor, only the existing physical characteristics can be considered in determining the backwater effect. (4)

Drainage Problems

Drainage problems within the City are generally limited to localized areas on a temporary basis, usually as a result of leaves or other obstructions blocking the drains. Drainage of the older parts of the City takes longer than City's newer areas because of smaller pipes and irregular curbs and gutters. The drainage system may not be capable of handling the runoff that would be generated by a 100 Year storm. If there are areas where water is temporarily backed up it is doubtful if it would result in flooding of structures. Most drainage outfalls are gated to prevent water backing up in the system in case of high river levels and to prevent polluted drainage water from going into the river, or basins or canal. However, some outfalls have only flap gates which are not reliable, manually operated slide gates or none at all.

PROBLEM MITIGATION AND HAZARD REDUCTION

Flooding cannot be completely prevented. The construction of flood control projects has increased the level of protection and reduced the frequency of flooding; however, some risk of flooding will remain and there is the frightening threat of inundation due to failure of flood control structures.

An overriding factor, that has been, and should continue to be, a consideration is the degree of protection necessary for any given area. Since flood control projects are costly, the degree of protection should be commensurate with the degree of acceptable risk and potential damage. (1)

In terms of flood control, the level of acceptable risk for the City of Lodi has been determined to a great extent with the construction of Camanche Dam and Reservoir. Camanche has a flood control reservation of 200,000 acre feet. (17) The Dam was completed in 1964 and is operated by East Bay Municipal Utility District.

Choices have also been made relative to land use and development, which have determined the extent and patterns of urbanization. Therefore, preventive measures directly impacting Lodi, that can be taken at this time, are limited to monitoring and improvement of dam and levee structures to contain anticipated flows and to withstand seismic or other forces that might cause structural failure, channel improvements, continued floodplain management and damage reduction measures.

Reduction of loss and damage is also achieved through emergency preparedness and loss mitigation programs.

Exhibit 9

METHODS TO REDUCE FLOOD DAMAGE (2)

Control of the Water	Control of the Land	Other
reservoirs	flood plain zoning	floodproofing
levees or flood walls	building codes	evacuation
channel improvement	subdivision regulations	urban redevelopment
bypasses or diversions	development policies	flood insurance
watershed management	open space maintenance	tax adjustments

A very thorough description of flood impacts and mitigation measures by land use type is in Development Guidelines for Areas of Statewide Critical Concern, Vol. II, Impact Charts, by Jones & Stokes for California Office of Planning and Research, July 1974. (19)

A flood management program for the City of Lodi is outlined in Exhibit 10 and discussed below. Flood Management programs and all mitigation or hazard reduction measures that are, or could be undertaken, must be evaluated on the basis of acceptable levels of risk. As pointed out above, in many cases decisions have been made which indirectly reflect the accepted level of risk.

Floodplain management is one method of damage reduction in a specific area.

Floodproofing of structures is another way of reducing flood damage; however, construction of city, and most privately-owned buildings and equipment structures to prevent inundation has not been done because little need to do that has been identified. Perhaps without full awareness of what was being done, an acceptable level of risk has been defined. This level of acceptable risk is further supported by the most recent floodplain information. Although there is a potential flood hazard, nearly all of the developed and growth area of the City of Lodi is outside of the 100 Year Flood area. The change of a 500 Year Flood occurring is very low with projected depths 3' or less in most areas; and liklihood of upstream dam failure is low (exactly how low has not been identified). The City's White Slough Water Pollution Control is in a definite floodprone area, therefore, the most significant structures have been floodproofed.

The City's electrical system has been designed to function in case of emergencies; however, substations, transformers and control buildings built at ground level for a variety of reasons, would be subject to inundation. However, in relation to the limited probability of flooding, it is not considered cost effective to floodproof these structures. A lack of power as a result of flood damage to Pacific Gas and Electric supply facilities outside of the area, or at the point of connection to the City system, is of greater concern than potential flood damage to local facilities. It is presumed that the P.G.&E. system is designed to minimize widespread loss of supply power, and the City is investigating other sources of power supply. The City will evaluate any alternative system's capability of functioning in time of disaster.

The City's water system, except the well vents, is sealed, making it essentially floodproof. It is assumed that floodwaters will be below the level of the vents.

Governmental or business records and other valuable items are generally stored in basements which would be the first areas to flood, and which are also subject to inundation from other sources such as runoff water possibly from firefighting, broken pipes, broken fire hydrants, overhead sprinklers, or overflowing sinks or tubs, to name a few. Protection can be achieved relatively economically with storage of the most important items in flood-proof containers or storage areas maintained at higher above-ground levels.

A similar situation also exists where telephone and radio equipment and emergency generators are in basements. Such is the case with the City's Emergency Operations Center, which is located in the basement of the Public Safety Building. The emergency generator, which supplies power to that facility as well as a portion of City Hall is also located in the basement. Per the County Emergency Plan, if the City's EOC cannot function, regional operations will be set up in Stockton. A temporary command post would be necessary for handling local police and fire activities. Although basements are subject to flooding, that level of risk must be weighed against the level of risk that may be present if items and operations are housed elsewhere, including the possibility of damage as a result of fire, theft, decreased security, attack, nuclear accident or earthquake. The economics of using needed 'people' space for storage is also a consideration in arriving at an acceptable level of risk.

Exhibit 10

FLOOD MANAGEMENT PROGRAM FOR CITY OF LODI

Area of Action	Action
FLOOD PROTECTION SYSTEMS	• Levee maintenance programs • Monitoring and Evaluation of integrity of dam structures • Upstream flood control reservoir projects
GENERAL PLAN AND POLICY LEVEL	• Implementation of Safety Element policies and update as needed • Policies for appropriate use of floodplain areas • Delineation of level of flood hazard risk acceptable to the overall City
ZONING ORDINANCE	• Enforcement of floodplain zoning ordinance and update as needed • Application of flood zones and regulations to floodplain areas
SUBDIVISION ORDINANCE	• Inclusion of flood protection measures in City Subdivision Ordinance where appropriate
BUILDING CODE	• Floodplain requirements pertinent to structures are covered in Floodplain Ordinance • Structures outside of Floodplain are not considered subject to flooding - an acceptable level of risk defined.
FUTURE DEVELOPMENT	• Review and conditioning of proposals in and near floodplain • Review and evaluation of all projects in City and environs for flood hazard potential and capabilities in time of flood • Definition of acceptable levels of risk for specific projects
EXISTING DEVELOPMENT	• Identification of areas of existing urban development and public installations in need of flood protection. • Development of methods of protection in each area of hazard
NATIONAL FLOOD INSURANCE PROGRAM	• Continuation of City participation in the program • Provision of flood information to lending institutions and insurance agents. • Establishment of record-keeping and report procedures as required by regulations.
PUBLIC INFORMATION	• Element policies and other floodplain information available to public. • Publicizing of inferred and stated acceptable levels of risk.
EMERGENCY PREPAREDNESS	• Emergency Services Plan consideration of flooding and potential hazards from a dam break and 500 Year Flood (based on acknowledgement of a potential hazard and subsequent level of acceptable risk). Inclusion of mass care centers, evacuation routes, evacuation alternative actions, issuance of flood warnings, and responsibility assignments.

ADAPTED FROM: Exhibit III-15, Safety-Seismic Safety Element, San Joaquin County.

Structural Improvements

At the present time there are no proposals to increase the holding capacity of Pardee or Camanche Reservoirs; however, the dam structures are regularly observed for stress, and hydrological conditions are constantly monitored.

There is little, if any, need for construction of new levees along the river within the City of Lodi; therefore, there are no design standards. Existing levees are no longer regularly exposed to moving water, appreciably decreasing the rate of levee deterioration.

Channel Improvement

At the present time the Mokelumne River channel at Lodi is not maintained and repeated low flows have resulted in decreased channel capacity due to vegetative growth and a buildup of debris. It is City and County policy that vegetation be maintained along waterways; therefore, any channel clearing projects to restore or maintain floodwater carrying capacity should be carefully evaluated. Periodic moderately high releases from Camanche Dam may be an alternative to regular channel maintenance.

Floodplain Management

The objective of floodplain management is to minimize the effects of flooding by requiring specific open space and development provisions in areas subject to the 100 Year Flood. On March 1, 1978 the City Council adopted Ordinance 1138 regulating the use of the Mokelumne River Floodplain and Special Flood Hazard areas. A copy of the ordinance is in Appendix A. The ordinance implements policies of this Element and the City's Open Space/Conservation Element of the General Plan, by regulating location, extension, conversion and alteration of land and structures located within the FP (Floodplain) zoned areas.

Any construction or alteration of the floodplain has the potential of affecting floodflows, perhaps even to the point of causing the River to 'permanently' change course. This is a particular concern where lagoons have been cut into the natural bank from the River to provide additional water frontage for homes, which could be adversely affected over the long-term. Bank stabilization efforts such as rocking or wall construction, if uniformly applied, may prevent changes in the streamcourse.

The Rivergate-Mokelumne Subdivision, approved prior to the latest floodplain information, is subject to street flooding in the 100 Year Flood.[1]

Damage Reduction Measures

The probability of extensive damage to specific facilities, equipment and other items, such as expensive landscaping, as a result of flooding can be reduced through positive actions. Like the overall concept of hazard reduction, the first step is identification of potential problem areas, followed by an evaluation of mitigation measures that can be taken, determination of an acceptable level of risk and finally action.

[1] Corps of Engineers letter, 14 October, 1976.

Evacuation

In the event of the Intermediate Regional Flood, floodplain areas within the City can be evacuated (or sandbagged) as necessary by regular emergency personnel and volunteers. The City does not have an established evacuation plan in the event of the Standard Project, or 500 Year Flood. Presumably individuals requiring evacuation from flooded areas will be directed by emergency personnel to mass care centers in those portions of the City of Lodi, County area, or City of Stockton which are not in danger of flooding.

The most potentially hazardous flood threat to the City of Lodi (but not necessarily the most likely to occur) is posed by upstream dam failure, as previously discussed on pages 13-15. The County Office of Emergency Services has prepared a Dam Failure Evacuation Plan, which describes City/County organization, actions and responsibilities, operational concepts and Dam Threat Evacuation Plans for each dam whose failure would affect San Joaquin County. Exhibit 4 describes routes and procedures for evacuation of City residents in case of failure of the upstream Mokelumne River structures.

It is unlikely that all individuals in the projected flood areas can be evacuated prior to inundation, for a variety of reasons, including traffic jams along the evacuation routes. Therefore, there is a need to establish evacuation priorities and alternative measures which can be followed after inundation, including movement of people (possibly by boat) to established points for later evacuation. 'Safe' locations may include upper stories of buildings strong enough to withstand the hydrostatic pressures and which are least likely to be subject to fire, etc. as a result of damaged gas or electrical lines. These are generally masonry buildings constructed after 1940 which do not have dirt basements. The City Hall is also considered a usable structure. Others are the public safety building and new multi-story bank, church and commercial structures.

Re-entry into the City will be controlled and only permitted when the area has been inspected and cleared by the various emergency services. There is no firmly established plan for restoring power in the City; however, electrical service will not be restored to each building until it has been inspected. Priorities would probably be critical facilities, housing, businesses and then industry, achieved through implementation of the existing circuit area power restoration procedure and the existing voluntary curtailment program. City service cannot be restored if P.G.&E. facilities are not operable.

Emergency procedures are outlined in the Police Department Manual, and the Fire Department will use information and procedures prepared by the County Office of Emergency Services. Protection of property from crime and fire will be an ongoing job after evacuation. Personnel may also be needed at care centers or other points. Both departments can request mutual aid from other areas if necessary and available.

Flood Insurance Program

The City of Lodi has participated in the National Flood Insurance Program since 1973 . "This program is part of a comprehensive approach by the Federal Government to reduce flood damage and to cope with the disastrous effects of floods. There are three major elements to the Program:

1. Identification of areas subject to flooding (Exhibit 2).
2. Sale of insurance to isolate the cost to affected parties.
3. Floodplain management, requiring areas subject to the 100 Year Flood to receive special development regulation (ordinance 27-12C)." (1)

The major benefit of participation is that flood insurance is available only in participant communities. A comparison of benefits is on page III-25 (Exhibit III-17) of the County Safety-Seismic Safety Element. Flood insurance can be purchased by anyone in the City and benefits consistent with the individual policy can be collected by policy holders whenever there is damage as a result of flood-type circumstances including dam failure and temporary localized drainage problems.

Most persons have some form of insurance to cover material losses in case of tragedy; however, flooding is often considered 'an act of God' and premiums in the past were either quite costly or not available, and many individuals and communities wanted disaster payments with little or no efforts at preventing recurring disasters. Therefore, the National Flood Insurance Program was established.

Prevention

Individual and community losses as a result of flooding, regardless of cause, are very difficult to mitigate. No matter how good the insurance program, evacuation, or emergency plans, they cannot substitute for preventive planning and subsequent implementation, which includes consideration of flood hazards and their potential for mitigation through land use and capital improvement planning.

EFFECTS ON LODI OF FLOODING ELSEWHERE

Those areas around Lodi are subject to flooding as a result of 100 Year Flood flows, and/or in case of dam failures are shown on Exhibit 3 and on pages III-35 to 40 in the County's Safety-Seismic Safety Element.

Although the City will not be directly impacted by the floodwaters, there will be secondary impacts. Traffic flow in and out of the City may be stopped or diverted, affecting commuters, stranded travelers, and delivery of food and services. Possible water well contamination in flooded areas will result in a need for alternative sources of pure water. It may be necessary to supply tanker trucks with water from the City system. City police, fire and other personnel and equipment, ambulances, as well as private industry personnel and equipment from Lodi may be called to other areas of the County (or neighboring counties) for mutual assistance, consistent with adopted County and City Emergency Plans. Lodi Memorial and Community Hospitals will receive an increased patient load as a result of flooding in these areas, and in case of inundation in the northern Delta of Sacramento and Solano Counties. Lodi schools, community centers, lodges and clubhouses, and churches as designated in adopted and forthcoming Emergency Plans may be needed as mass care centers or for temporarily housing those evacuated from flooded areas. Motels and private homes may also be needed. The Lodi Emergency Operations Center (EOC) in the Public Safety Building, is designated as an alternative EOC for both County and City of Stockton, but does not include the County Hospital.

may also be needed. The Lodi Emergency Operations Center (EOC) in the Public Safety Building, is designated as an alternative EOC for both County and City of Stockton, but does not include the County Hospital.

As previously discussed, flooding elsewhere can have an adverse effect on the City's supply of electricity and possibly on the treatment and disposal of sewage, and disposal of solid waste.

CHAPTER 3

GEOLOGIC HAZARDS

The Policies and Implementation of this Chapter are based on the following

ASSUMPTIONS

The City of Lodi assumes that:

- The earthquake faults in the Owens Valley, Butte County, Kern County, Nevada, and other regions equally far from Lodi do not pose a significant seismic hazard to the City;
- The "maximum credible" earthquake affecting Lodi will produce groundshaking in the Lodi area equivalent to an Intensity VIII or IX on the Modified Mercalli Scale;
- An earthquake of Intensity VIII or IX could occur at any time;
- Groundshaking as a result of seismic activity poses the greatest geologic hazard to structures in Lodi;
- A "maximum credible" earthquake will cause serious damage to structures in Lodi, particularly in the downtown area;
- The probability of liquefaction or subsidence occurring in Lodi is small; however, the possibility exists;
- Wind erosion is not a serious problem in Lodi.

The City of Lodi adopts the following

POLICIES

- The City will support programs and studies intended to more precisely define the "maximum probable event" and its effects.
- The City will support and encourage study of the area's subsurface composition.
- Facilities to be used in emergency responses should be capable of remaining operational following a maximum credible earthquake. The facilities include communication equipment centers, police and fire stations, emergency shelters, medical facilities, utilities, and major transportation routes.
- The City of Lodi considers resident care facilities and emergency repair equipment storage buildings to be Essential Facilities, in addition to those specifically listed in the Uniform Building Code, 1979; therefore, more stringent structural requirements, as defined by the UBC, will apply.
- Facilities whose failure could cause large number of injuries or deaths should be capable of withstanding a maximum credible earthquake. Specific facilities to be considered are private schools, auditoriums, commercial buildings and community facilities such as centers and libraries.
- The City will encourage and support continued monitoring and analysis of foothill fault zones, especially the Melones and Bear Mountain zones, and studies to determine the potential effect of movement in the zones on the City of Lodi.
- Proposals for new dams, particularly in the Sierra foothill areas, should consider the seismic hazard, and no dams should be built if there is a probable hazard to the City of Lodi.
- The City of Lodi will establish a level of seismic safety which provides protection against loss of life or serious injury.
- The need for continued vital services and functions in case of seismic occurrences will be considered in all pertinent City decisions.
- The City will encourage rehabilitation of seismically hazardous structures, and will seek alternatives to demolition and complete destruction of architectural elements in historically significant buildings.
- Seismic loads will be considered in the design and conservation of all City structures and equipment.

Based on the adopted Policies, the City of Lodi will pursue the following

IMPLEMENTATION MEASURES

- Inclusion of an inventory of structures which are likely to fail or pose a hazard in an earthquake, in future Community Development plans. A program for abatement of the hazards should be prepared, and it should include identification of specific measures for preservation of architecturally or historically significant structures.

- Enforcement of the structural requirements of the Uniform Building Code as it pertains to seismic safety.

- Compilation of methods to reinforce hazardous architectural ornaments, particularly parapets, cornices, and marquees. This information should be made available to owners of hazardous structures.

- Development of public information programs emphasizing earthquake preparedness.

- Development of a program to inform City employees working in older buildings of what to do in case of an earthquake.

- Specialized training of emergency personnel in procedures to be followed in case of a major earthquake.

- Check of older City-owned structures which are designated "essential facilities," by a structural engineer to determine their ability to withstand the maximum credible earthquake, and repair of replacement of seriously defective structures.

A DISCUSSION ON

GEOLOGIC HAZARDS

AFFECTING THE CITY OF LODI

LODI'S GEOLOGIC ENVIRONMENT

The Lodi area is basically flat with elevations ranging from 30 to 50 feet above sea level. The City is located in northern San Joaquin County, in an area known as the Central Valley Reg ion, bounded by the Sierra Nevada foothills on the east and the Coastal foothills on the west. Underlying the entire area are surficial deposits of unconsolidated and semi-consolidated alluvium consisting of gravels, sands, silts and clays. The alluvial material grades downward into older, well-consolidated sedimentary rocks.

The geologic evolution of the Lodi area is illustrated in Exhibit 11.

SEISMIC ACTIVITY

Seismic activity, or earthquakes, are caused by the release of energy that has been stored within the earth. The basic mechanism which causes the generation and subsequent release of energy is being constantly debated; however, it is evident that when the stress is great enough, the earth's crust breaks or slips along an older crack (fault) or forms a new one. Areas where a number of parallel slippages occur are called fault zones. When an earthquake occurs, the break along the fault begins in a small area and rapidly moves up and down the fault. The location of the first release of energy is called the focus. The point on the earth's surface directly above the focus is called the epicenter. (1)

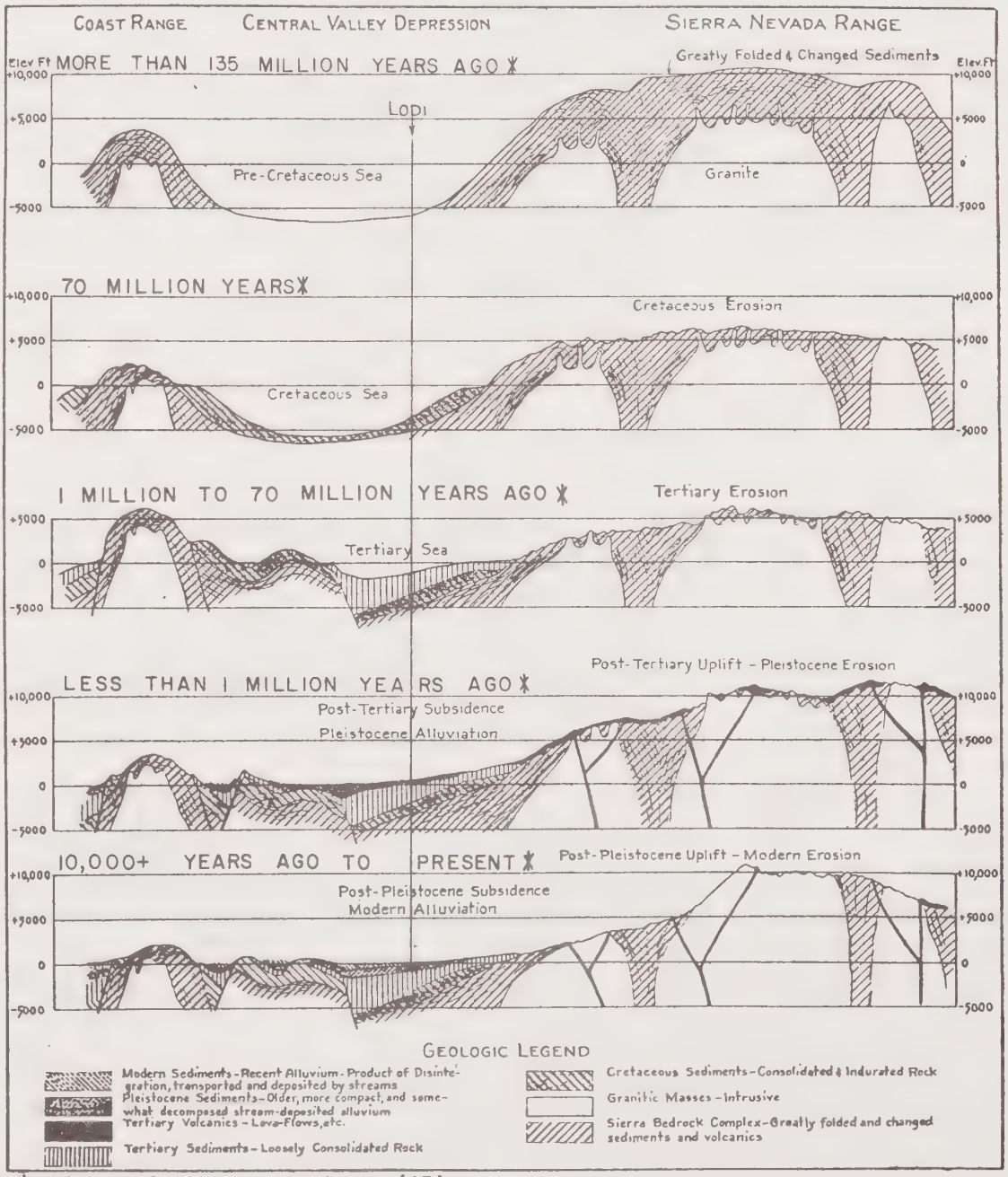
Releases of energy may occur in a few large amounts, or in more numerous, smaller amounts. A more or less constant release of energy (creeping) can also occur. During an earthquake, opposite sides of a fault move in relation to each other. Movement might occur at great depths and be hidden within the earth or may extend to the earth's surface and form a surface break (trace). (1) Faults affecting Lodi are discussed on page 37 .

It is extimated that more than a million earthquakes occur throughout the world annually, ranging from catastrophic shocks to tremors that are barely noticeable. Two-thirds of the seismic activity of the United States is centered in the Pacific Coast and Nevada areas, most of it in the Coastal ranges of California (Exhibit 15).

Exhibit 11

GEOLOGIC EVOLUTION OF THE LODI AREA

TRANSACTIONS, AMERICAN GEOPHYSICAL UNION (51)



✱ Time reference approximate (45)

MEASURES OF SEISMIC ACTIVITY (1)

Earthquakes are measured in two different ways: 1) by the amount of energy being released; and 2) by their physical effects. The scale used to measure the magnitude of earthquakes (energy released) is the Richter Scale. The scale used to measure intensity (physical effects) of an earthquake is the Modified Mercalli Scale.

Richter Scale

In 1932, Charles Richter devised a method of measuring the magnitude of an earthquake using seismic instruments. The magnitude is a number assigned to the calculated enrgy release of an earthquake. This system can be used to rank and compare the energy release of various earthquakes.

The Richter Scale is logarithmic. An increase of one number in magnitude is the same as a 32 times increase in energy. Thus a magnitude 7 earthquake releases 32 times more energy than a magnitude 6 earthquake. Exhibit 12 compares different events on the Richter Scale.

Exhibit 12

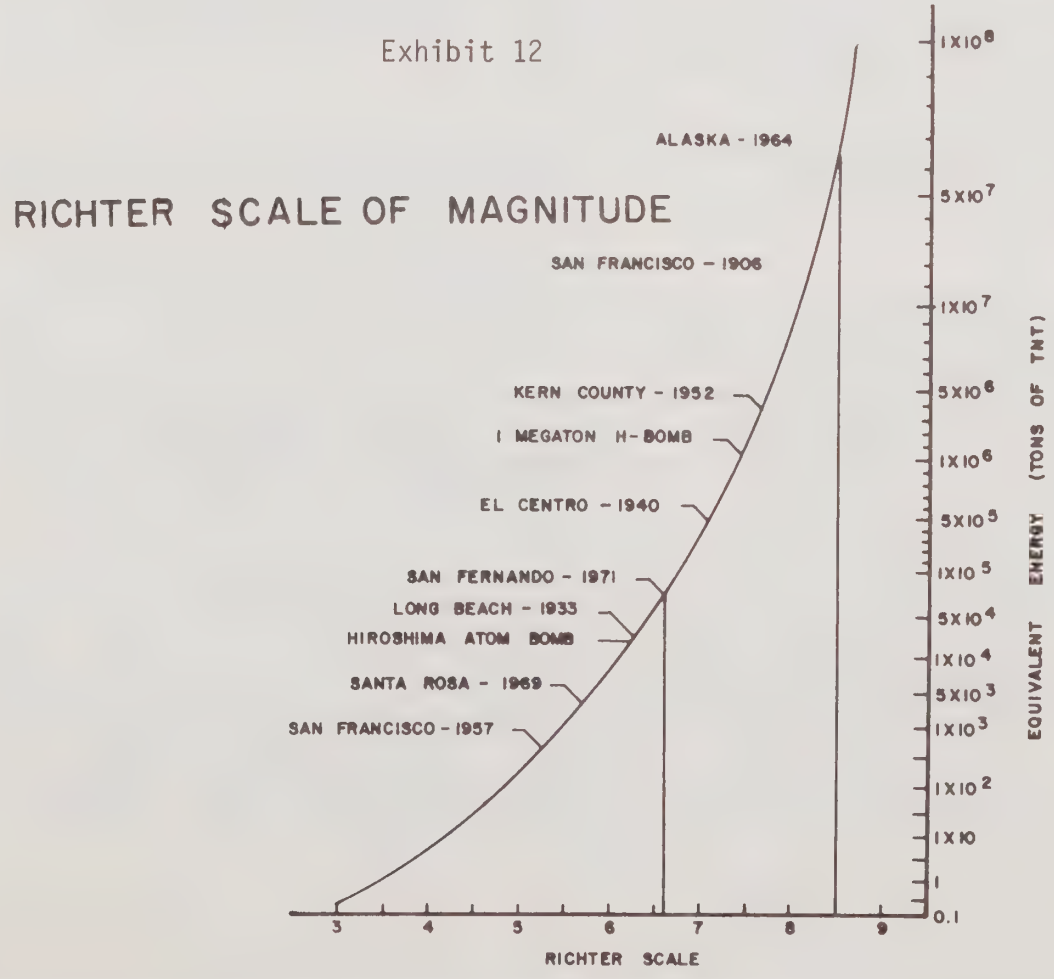


Exhibit 13

MODIFIED MERCALLI SCALE

If most of these effects are observed	*then the intensity is*
Earthquake shaking not felt, but people may observe marginal effects of large distance earthquakes without identifying these effects as earthquake-caused. Among them trees, structures, liquids, bodies of water sway slowly, or doors swing slowly.	I
Effect on people: Shaking felt by those at rest, especially if they are indoors, and by those on upper floors.	II
Effect on people: Felt by most people indoors. Some can estimate duration of shaking. But many may not recognize shaking of building as caused by an earthquake; the shaking is like that caused by the passing of light trucks.	III
Other effects: Hanging objects swing. *Structural effects:* Windows or doors rattle. Wooden walls and frames creak.	IV
Effect on people: Felt by everyone indoors. Many estimate duration of shaking. But they still may not recognize it as caused by an earthquake. The shaking is like that caused by the passing of heavy trucks, though sometimes, instead, people may feel the sensation of a jolt, as if a heavy ball had struck the walls. *Other effects:* Hanging objects swing. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. *Structural effects:* Doors close, open or swing. Windows rattle.	V
Effect on people: Felt by everyone indoors and by most people outdoors. Many now estimate not only the duration of shaking but also its direction and have no doubt as to its cause. Sleepers wakened. *Other effects:* Hanging objects swing. Shutters or pictures move. Pendulum clocks stop, start or change rate. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. Liquids disturbed, some spilled. Small unstable objects displaced or upset. *Structural effects:* Weak plaster and Masonry D* crack. Windows break. Doors close, open or swing.	VI
Effect on people: Felt by everyone. Many are frightened and run outdoors. People walk unsteadily. *Other effects:* Small church or school bells ring. Pictures thrown off walls, knicknacks and books off shelves. Dishes or glasses broken. Furniture moved or overturned. Trees, bushes shaken visibly, or heard to rustle. *Structural effects.* Masonry D* damaged; some cracks in Masonry C*. Weak chimneys break at roof line. Plaster, loose bricks, stones, tiles, cornices, unbraced parapets and architectural ornaments fall. Concrete irrigation ditches damaged.	VII
Effect on people: Difficult to stand. Shaking noticed by auto drivers. *Other effects:* Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Furniture broken. Hanging objects quiver. *Structural effects:* Masonry D* heavily damaged; Masonry C* damaged, partially collapses in some cases; some damage to Masonry B*; none to Masonry A*. Stucco and some masonry walls fall. Chimneys, factory stacks, monuments, towers, elevated tanks twist or fall. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off.	VIII
Effect on people: General fright. People thrown to ground. *Other effects:* Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes. Steering of autos affected. Branches broken from trees. *Structural effects:* Masonry D* destroyed; Masonry C* heavily damaged. Sometimes with complete collapse; Masonry B* is seriously damaged. General damage to foundations. Frame structures, if not bolted, shifted off foundations. Frames racked. Reservoirs seriously damaged. Underground pipes broken.	IX
Effect on people: General Panic. *Other effects:* Conspicuous cracks in ground. In areas of soft ground, sand is ejected through holes and piles up into a small crater, and, in muddy areas, water fountains are formed. *Structural effects:* Most masonry and frame structures destroyed along with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes and embankments. Railroads bent slightly.	X
Effect on people: General panic. *Other effects:* Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. *Structural effects:* General destruction of buildings. Underground pipelines completely out of service. Railroads bent greatly.	XI
Effect on people: General panic. *Other effects:* Same as for intensity X. *Structural effects:* Damage nearly total, the ultimate catastrophe. *Other effects:* Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.	XII

**Masonry A*	Good workmanship and mortar, reinforced designed to resist lateral forces.
**Masonry B*	Good workmanship and mortar, reinforced.
**Masonry C*	Good workmanship and mortar, unreinforced.
**Masonry D*	Poor workmanship and mortar and weak materials, like adobe.

Modified Mercalli Scale

The intensity of the physical effects of earthquakes are based on human reactions at the low end of the Modified Mercalli Scale (e.g. "felt indoors by a few"), and by geologic effects at the high end of the Scale (e.g. "numerous and extensive landslides). The middle range is based largely on the degree of damage to manmade structures. Ratings are based on human observations and are not measured with instruments. The intensity of an earthquake varies from place-to-place because of geologic conditions, distance from the earthquake epicenter, and type of buildings structures. Exhibit 13 describes the twelve (12) levels of intensity.

FAULTS

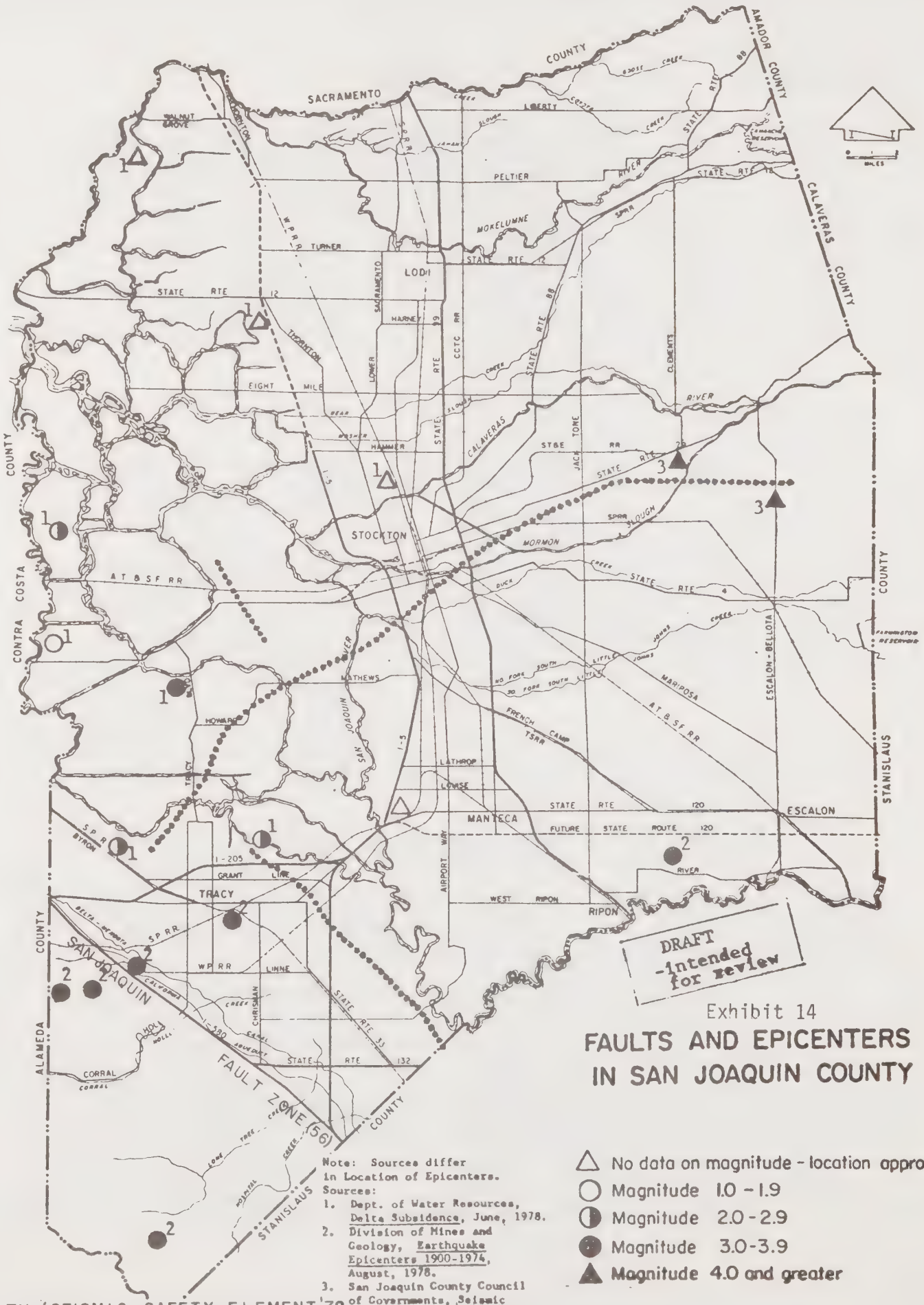
There are no known faults which pass directly through the Lodi area, but the City could experience ground shaking from other faults in surrounding regions. Faults are indications of past seismic activity. It is assumed that those that have been active recently are the most likely to be active in the future, although even an inactive fault may not be "dead". The recency of activity is measured in geologic terms, or geologic time. Geologically recent is within the past two million years (the Quaternary period). All faults believed to have been active during Quaternary time are considered "potentially active" by the State Division of Mines and Geology. Those which have exhibited activity within the last 11,000 years are called "active".

If a fault is considered to be "historically active," it has exhibited activity within the last 200 years. Faults for which there is no evidence of activity during the last two million years are considered to be "inactive". (42)

Exhibits 14 and 15 illustrate faults located in and near San Joaquin County. Seismic activity on these faults, or in fault zones, has the greatest potential for causing damage in Lodi. Some of the faults are inactive and others active as discussed in the brief descriptions below. A more detailed description of the faults and fault zones is in the San Joaquin County Safety-Seismic Safety Element. (1)

Major seismic activity in other parts of the State can also affect the City of Lodi; however, the potential impact is expected to be less than that which may be caused by significant seismic activity in the fault zones discussed below.

Exhibits 17 to 22 illustrate the experienced intensities of 6 earthquakes which have occurred along faults described.


SACRAMENTO COUNTY
AMADOR COUNTY
CALAVERAS COUNTY
STANISLAUS COUNTY
CONTRA COSTA COUNTY
ALAMEDA COUNTY
SAN JOAQUIN COUNTY
LODI
STOCKTON
MANTECA
ESCALON
TRACY
RIPON
LATHROP
LOUISE
HARNEY
EIGHT MILE
MATHEWS
HOWLAND
PELTIER
MOKELUMNE
TURNER
WALNUT GROVE
LIBERTY
STATE RTE 12
STATE RTE 88
STATE RTE 4
STATE RTE 120
STATE RTE 132
FUTURE STATE ROUTE 120
I-5
I-205
I-580
SACRAMENTO RIVER
SAN JOAQUIN RIVER
CALAVERAS RIVER
MOKELUMNE RIVER
STANISLAUS RIVER
MORMON SLOUGH
DUCK CREEK
FRENCH CAMP SLOUGH
MARIPOSA
ESCALON-BELLOTA
JACK TONE
O'DEMS
GRANT LINE
LINNE
CHRISMAN
CORRAL
HOLLOW
AIRPORT WAY
WEST RIPON
AT & SF RR
SP RR
WP RR
TSRR
SPRR
CCTC RR
DRAFT
-intended for review
FAULT ZONE (56)
Exhibit 14
FAULTS AND EPICENTERS
IN SAN JOAQUIN COUNTY
Note: Sources differ in Location of Epicenters.
Sources:
1. Dept. of Water Resources, Delta Subsidence, June, 1978.
2. Division of Mines and Geology, Earthquake Epicenters 1900-1974, August, 1978.
3. San Joaquin County Council of Governments, Seismic Safety Element, May, 1973.
No data on magnitude - location approx.
Magnitude 1.0 - 1.9
Magnitude 2.0 - 2.9
Magnitude 3.0-3.9
Magnitude 4.0 and greater

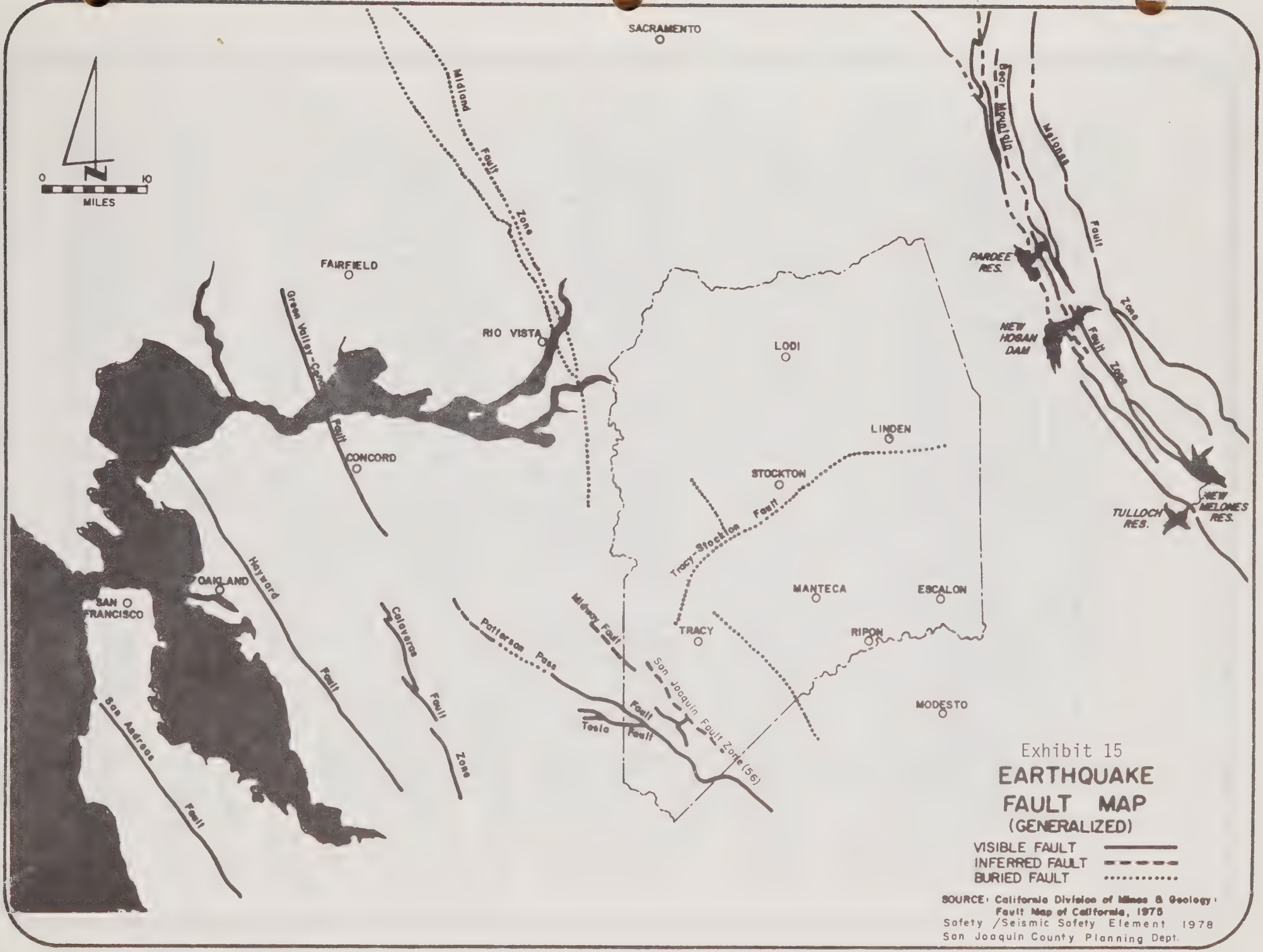


Exhibit 15

EARTHQUAKE FAULT MAP (GENERALIZED)

VISIBLE FAULT ——————

INFERRED FAULT – – – – –

BURIED FAULT .....

SOURCE: California Division of Mines & Geology: Fault Map of California, 1975

Safety /Seismic Safety Element 1978

San Joaquin County Planning Dept.

San Andreas

The San Andreas Fault is one of the longest and most active faults in the world. Segments of the fault are creeping regularly, while other segments appear to be temporarily "locked." It is generally agreed that a "locked" condition allows stresses to accumulate more rapidly, thus shortening the time between major earthquakes. It is practically a certainty that moderate to great earthquakes will occur on the fault in the foreseeable future. The maximum probable intensity which could occur in the City of Lodi, and most of San Joaquin County would be VIII or IX on the Modified Mercalli Scale - large enough to cause intense fright and serious damage. (Exhibit 13).

Hayward Fault

Numerous small earthquakes (Richter Scale Magnitude of 3 to 5) have occurred along this fault in recent years, indicating continued activity. Two major earthquakes with a Richter Scale Magnitude of 6.5 to 7.5 were recorded in 1936 and 1868.

Calaveras Fault

In 1868 an earthquake of unknown magnitude caused ground breakage near Danville, and other recent earthquakes with Richter Magnitude up to about 4.5 have been located along, or near, this fault. The epicenter of an earthquake of 5.9 Richter Scale Magnitude was recorded along the Calaveras Fault on August 6, 1979. The tremor was the strongest experienced in the Bay Area since 1911. The intensity experienced in Lodi was about I to III on the Modified Mercalli Scale, and up to VI in Stockton.

Green Valley-Concord Fault

An earthquake of 5.4 magnitude occurred in 1955 along part of the fault near the City of Concord. There is currently evidence of some movement along the fault in Concord. The greatest probable earthquake generated by this fault is not expected to exceed a magnitude of 7.0 on the Richter Scale.

Midland Fault

The maximum credible earthquake which would be generated by this well-documented fault is a magnitude of 7.0 on the Richter Scale.

San Joaquin Fault Zone

This is a newly·identified fault system which shows evidence of activity during the Quaternary period (56).

This fault system extends from Tracy to Dos Palos, along the east flank of the Coastal Ranges and includes the Midway Fault. The potential effect on Valley communities, of movement along faults in this zone, is currently being studied by the U.S. Geological Survey. Seismic activity in this newly

identified zone may pose as serious a threat to valley communities, including Lodi as the San Andreas Fault and major foothill faults.

Tracy-Stockton Fault

Although no surface trace of the Tracy-Stockton Fault has been mapped, and subsurface data indicates no appreciable movement has occurred on the Fault for five million years or more, there is evidence of activity near the easternmost subsurface positions. Three separate earthquake epicenters have been located near Linden; therefore, it is believed that there is a possibility of an active fault capable of at least a 5.0 Richter Magnitude earthquake located in or near the central part of San Joaquin County. This fault is more thoroughly described in the San Joaquin County Council of Governments Seismic Safety Element. (43)

Melones-Bear Mountain Fault Zones

The Melones and Bear Mountain Fault Zones have exhibited little seismic activity and have been considered to be inactive, since no evidence has been found of Quaternary fault movement. However, on August 1, 1975, a 5.7 Richter Magnitude earthquake took place near Oroville. The Oroville earthquake is important because it took place in an area where a quake of such magnitude was not expected and because it occurred in the Sierra Nevada foothills. The State Geologist's report says, "The Oroville earthquake suggests that this event is indicative of future earthquakes within the fault zones of the western Sierra Nevada foothills. If this hypothesis is reasonable, earthquakes of at least magnitude 6 should be anticipated...." The report goes on to state, ".....the fault zones of the Western Sierra Nevada foothills extending from Bakersfield to Chico should be reanalyzed with consideration given to the 1940 and 1975 earthquakes in Butte County, the alignments of the faults associated with topographic features of terrain and current "state of the art" in both seismology and geology."[1]

Since upstream dam failure (Chapter 2) could lead to massive flooding in San Joaquin County, and possibly the City of Lodi, it is extremely important that Melones and Bear Mountain Fault zones be reanalyzed and monitored. "Many geologists and seismologists feel that this earthquake is a fair warning that earthquakes of magnitude 6 can occur anywhere in California, at any time....."[2]

Other Faults

Earthquakes along faults in the Owens Valley, Kern County (White Wolf Fault), near Oroville, and in Nevada have been felt in Lodi. However, because of the distance of these faults they are not considered to pose a significant seismic hazard to the City.

---

[1]California State Division of Mines and Geology: Oroville, California Earthquake, August 1975, Special Report 124, 1975.

[2]Ibid.

The isoseismal maps on the following pages show lines of equal earthquake intensity plotted for six of the above earthquakes.

Exhibit 17

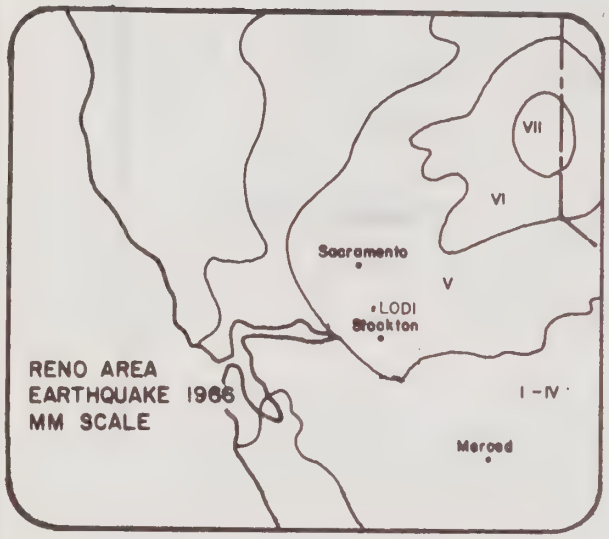


Exhibit 18

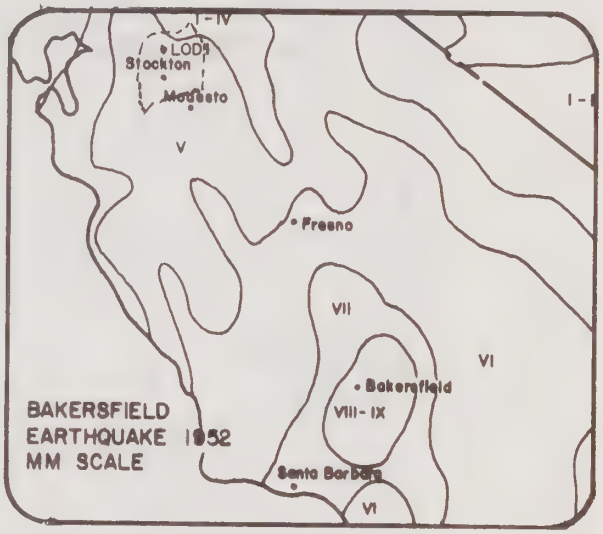


Exhibit 19

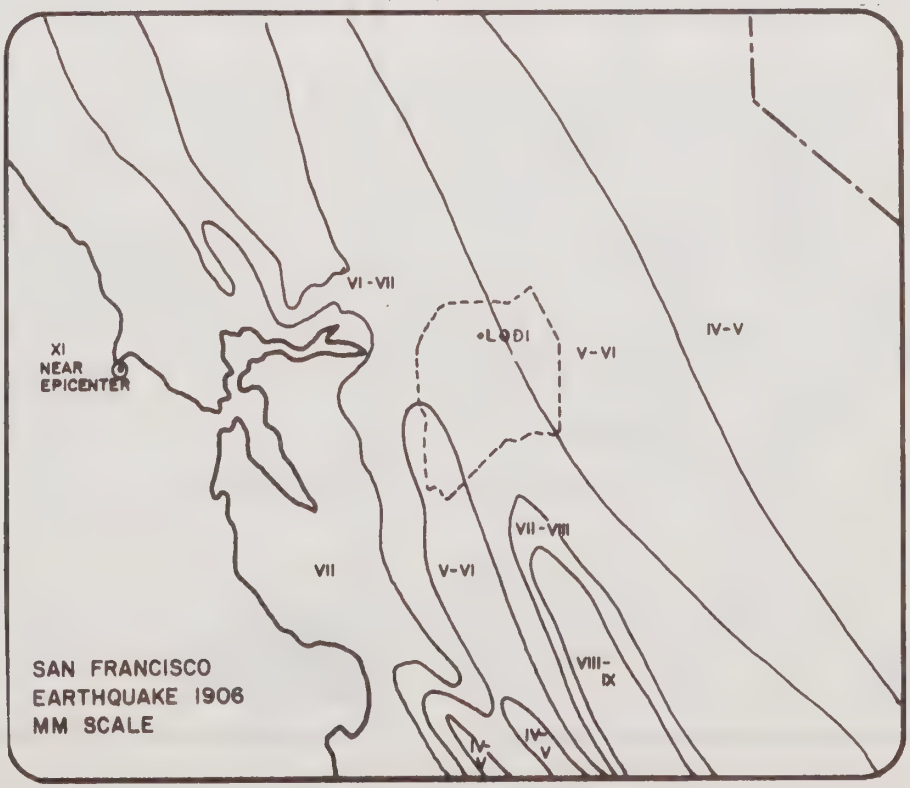


Exhibit 20

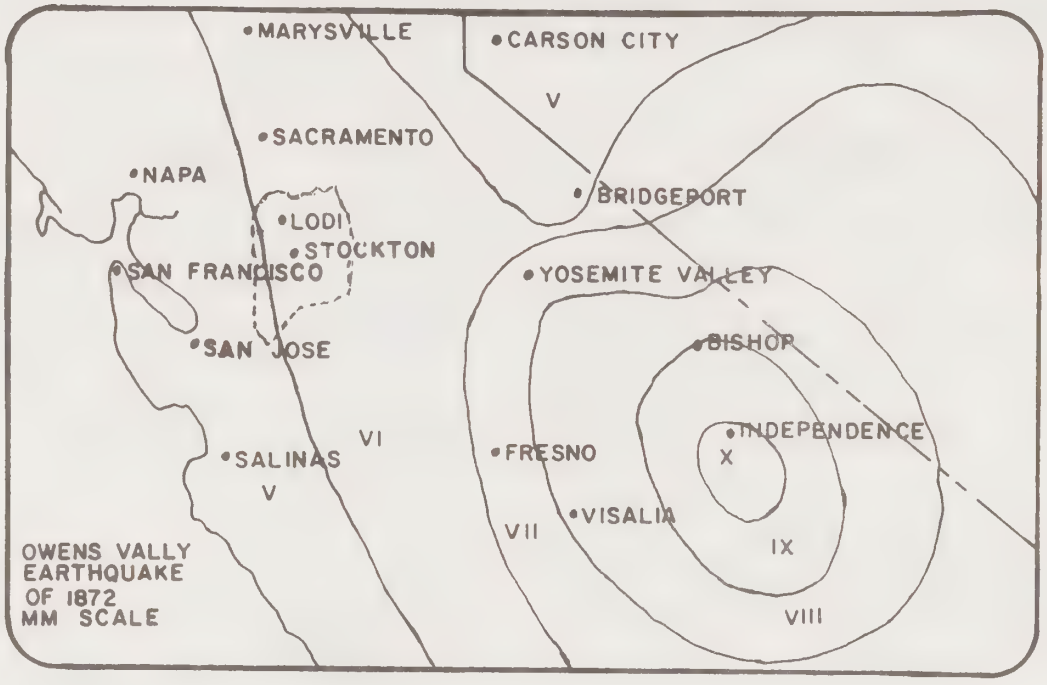


Exhibit 21

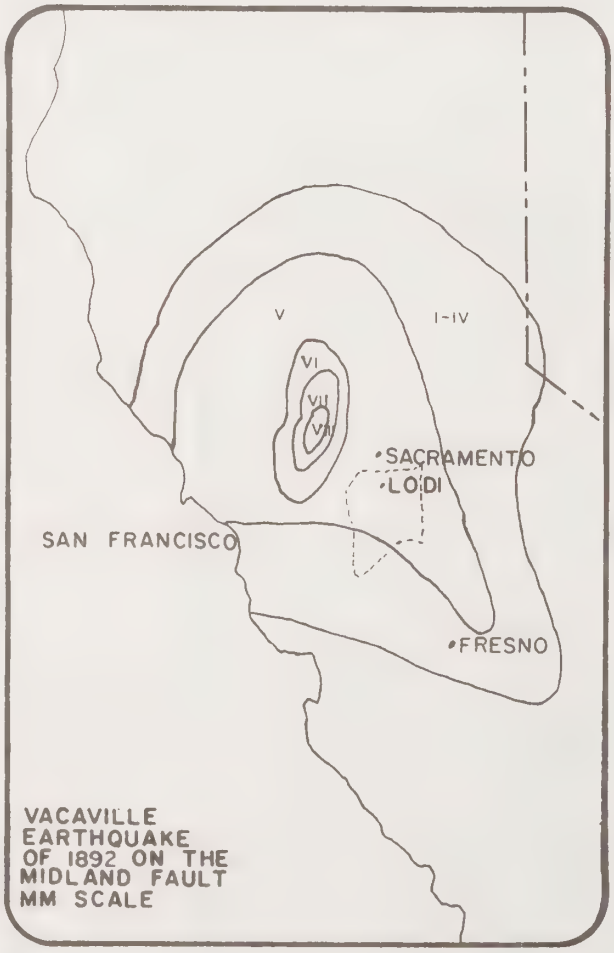
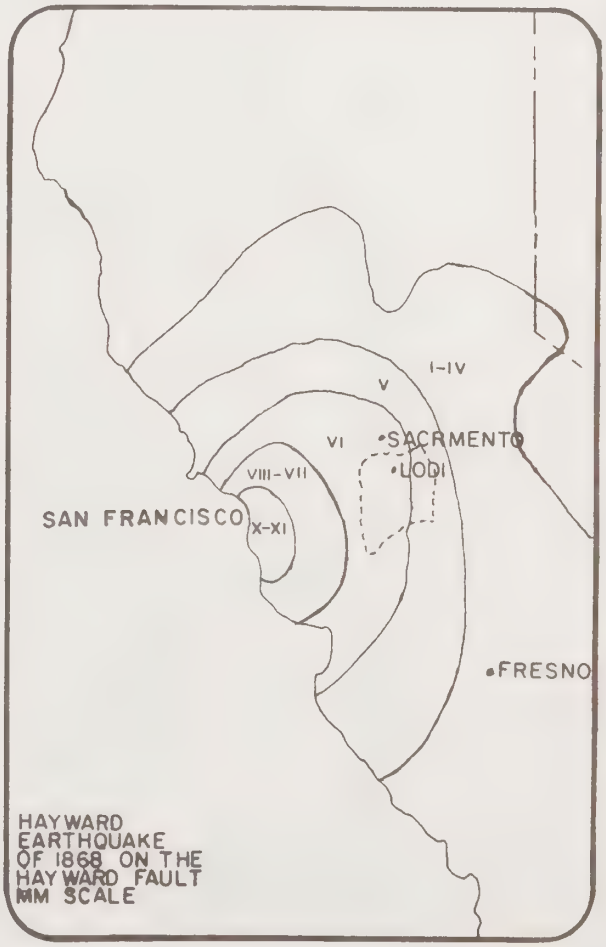


Exhibit 22



THE MAXIMUM CREDIBLE EARTHQUAKE

The "maximum credible" earthquake describes the largest earthquake which can reasonably be expected to occur. Exhibit 23 describes the Historical Maximum Richter Magnitude and the Maximum Credible Richter Magnitude for earthquakes epicentered in or on the fault zones closest to Lodi.

Data on the dynamic properties of the subsurface soils beneath the Lodi area is insufficient to precisely define the characteristics of the "maximum credible" earthquake at ground surface; however, based on existing information, it is reasonable to expect groundshaking in the Lodi area to be equivalent to an intensity of VIII of IX on the Modified Mercalli Scale.

With an Intensity VIII tremor, most people would find it difficult to stand up and the shaking would be noticeable to those in moving vehicles. The motion would cause large bells to ring, furniture to break, and hanging objects to quiver. Structurally, buildings of "Masonry D"[1] construction would be heavily damaged and in some cases there would be structural collapse; Masonry C buildings would be damaged and Masonry B buildings would be partially damaged. Masonry A buildings would not be damaged.

There could be failure of stucco and masonry walls, as well as chimneys, factory stacks, monuments, towers and elevated tanks. Frame houses, of which there are many in Lodi could be moved on the foundations if they are not bolted down, and loose panel walls will be thrown out. Sand or gravel banks may slide or cave in and water bodies will have waves and become turbid and muddy.

An Intensity IX earthquake is quite serious. A pervading atmosphere of fright is characteristic and the motion would be sufficient to throw people to the ground. It would be difficult to steer a vehicle and branches may be snapped from trees. There may also be changes in flow or temperature in springs and wells, and cracks in wet ground. Structural effects would be: Masonry D, destroyed; Masonry C, heavily damaged, sometimes with complete collapse; Masonry B, seriously damaged. There will be general damage to foundations and racking of building frames, with unbolted frame structures shifting off of foundations. Reservoirs and underground pipes would be seriously damaged. A strong earthquake in the foothills would be significant to Lodi area residents because of Camanche Dam.

Intensities of previous earthquakes felt in the Lodi area are described on pages 42 to 44 .

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[1] See Exhibit 13 for an explanation of the "Masonry" categories. (page 36)

Exhibit 23

SEISMIC TABLE

Referenced to Stockton/Lodi

Fault or Fault Zone	Approximate distance from Lodi to Closest Point of Fault Zone	Fault Activity Rating[1]	Historical Maximum Richter Magnitude	Duration of Strong Shaking	Maximum Credible Event in Richter Magnitude	Maximum Credible Earthquake Intensity Expected to Occur in Lodi (MM Scale - See Exhibit 13).	Estimated Recurrence of Maximum Credible Event	Maximum Acceleration or Predominant Period of Rock Acceleration[2]
Tracy/Stockton Fault	12 miles	6	5	30 seconds	5+	VII to IX	Unknown	.11
San Andreas	74 miles	1	8.3	24 seconds	8.3	VIII to IX	102 years	.11
Hayward	56 miles	1,2,3	7.5	24 seconds	7.5	VII to IX	50 to 200 years	.11
Green Valley	38 miles	4	7	less than 18 sec		VII to IX	Unknown	.07
Midland Fault	20 miles	5	7.0	30 seconds		VII to IX	Unknown	.13
San Joaquin	20 - 30 miles							
Calaveras	45 miles	1,2,3,	7.5 ($6^{\pm}$ in 1979)	37 seconds	7.5	VII to IX	50 to 200 years	.13
Bear Mountain	22 miles							
Oroville	80+ miles							

[1] Fault Activity Ratings

1 to 4 Strong Evidence of a Relatively High Degree of Activity
- 1 Surface rupture during a historic earthquake
- 2 Presently occurring creep
- 3 Alignment of earthquake epicenters
- 4 Recent geologic surface displacement, but no historic records.

5 Possible Source of a Major Historic Earthquake

6 Possible Source of Small Historic Earthquakes

[2] Rock: Any material with a shear wave greater than 2000 feet/second.
Ground surface acceleration will differ depending upon subsurface ground conditions.
Accelerations are based on data given for Stockton in the San Joaquin County Safety/Seismic Safety Element.

This table has been derived from COG Seismic Safety Element and the San Joaquin County Safety/Seismic Safety Element.

Referenced sources are:
Greensfelder, Roger, "Maximum Credible Rock Acceleration from Earthquake in California," Division of Mines and Geology, Sacramento, 1974.
Wallace, R.E., "Earthquake Recurrence Intervals on the San Andreas Fault," Geological Society of America Bulletin, Vol. 81, pp.2875, 1970.
Schnable, P.B. and Seed, H.B., "Acceleration in Rock for Earthquakes in the Western United States," Earthquake Engineering Research Center Report, University of California, Berkeley, June, 1972.
Seed, H.B., et al. "Characteristics of Rock Motions During Earthquakes," Journal of Soil Mechanics and Foundations, Div. ASCE, Vol. 95, pp. 1199-1218, September, 1969.

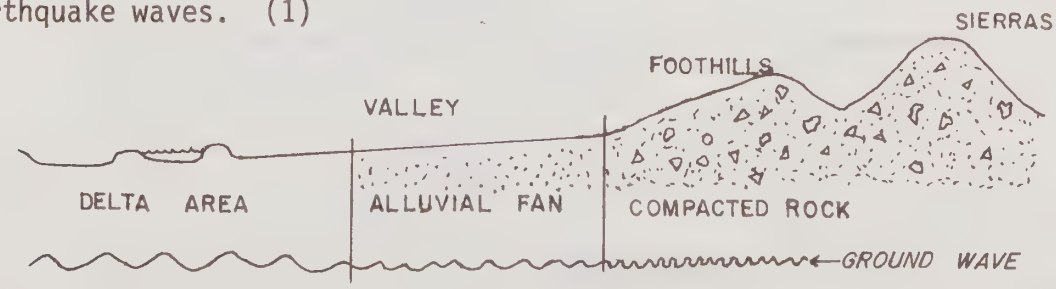
The Maximum credible earthquake has been defined and identified in order to provide a basis for planning and design, particularly of structures. Estimates of the recurrence interval of fault movements can be made, based on historic records. However, it should be emphasized that recorded data are not sufficient to provide precise recurrence intervals of the maximum probable earthquake. In other words, at this time, it is not possible to precisely predict when intense earthquakes will occur; however, scientists do know for certain that they will occur. Therefore, key structures (hospitals, schools, stadiums, fire stations, high-rise buildings, etc.) should be designed according to the "maximum credible" event. Key structures in the City of Lodi are discussed in the following section.

INITIAL EFFECTS OF AN EARTHQUAKE

Groundshaking

The stress release of an earthquake is expressed in several ways on the earth's surface. The most common expression is groundshaking, the result of wave movement through the rock materials of the earth's crust. Strong groundshaking as a result of movement along any of the faults previously described poses a seismic threat to the City of Lodi and surrounding area. The intensity of groundshaking from earthquakes on any of the faults described is dependent on the earthquake's magnitude, distance and subsurface soil and rock properties.

As ground waves pass from rock to less dense materials, (e.g. alluvial or water-saturated soils), they reduce speed and generally increase in the extent of vibration, resulting in shaking for a longer period of time with larger, slower vibrations. Therefore, distance from an earthquake alone does not necessarily determine the intensity and duration of groundshaking that will occur. Surface topography also can amplify earthquake waves. (1)



Ground shaking will last longer and have greater amplitude (extent of vibration) in the deeper less consolidated soils than in compacted soils and rock.

Exhibit 24

Lodi is located on deep deposits of soft soils where the groundshaking will last longer and have greater amplitude (extent of vibration) as shown on Exhibit 24 , than in the compacted soils and rocks.

In general, deep deposits of soft soils tend to produce ground motions which have a greater effect on tall structures and lesser effects on short, rigid structures.

Structural Damage

The possibility of ground rupture, or surface faulting, in Lodi is very unlikely; however, the initial effects of seismic activity, or more simply, the groundshaking, poses the greatest geologic hazard to structures in Lodi.

Fortunately, seismic understanding has increased greatly in recent years, and since an impetus has been exerted by the 1971 San Fernando Valley Earthquake, many changes have been made in structural standards and in determinations of seismic risk.

Exhibit 25 illustrates the lateral forces at work on structures during earthquake motion.

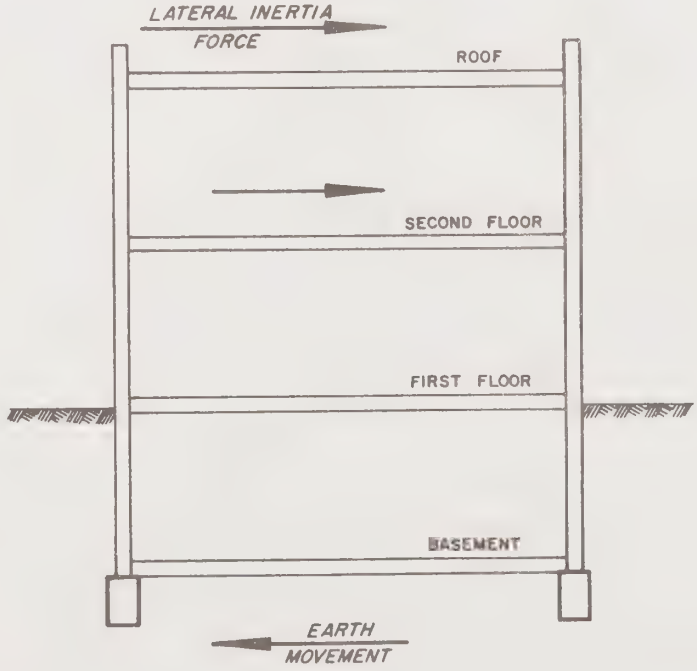


Exhibit 25

LATERAL FORCES DUE TO EARTHQUAKE MOTION

In an earthquake, the most hazardous parts of a building generally are unreinforced masonry units. The following excerpt from the Contra Costa County Seismic Safety Element explains how such building parts have fared in previous earthquakes. (1)

> "Parapets and Chimneys. Probably the greatest loss of life from earthquakes has resulted from the failure of unreinforced unit masonry, particularly unreinforced brick parapets on commercial buildings. Persons on the streets or inside buildings are often injured by such falling masonry. Chimneys can also be a great hazard in houses and small apartments.
>
> "Signs and Appendages. Signs, marquees, cornices, canopies and general ornamentation extending out from buildings pose a great potential hazard in earthquakes if not adequately anchored to the building.
>
> "Facades. Two kinds of hazards can be caused by building facades. Masonry veneer facades inadequately anchored, can be shaken loose by an earthquake, causing danger similar to parapets. On the other hand, open glass facades as on stores, can cause amplified twisting to the building and shattering of glass on the sidewalk." (50)

The Hazard Comparison Table (Exhibit 26) shows the relative safety of various types of buildings in an earthquake. The safest are one-story, small, wood frame buildings, like many of Lodi's residences. The most hazardous are unreinforced brick, adobe, hollow concrete block or hollow clay tile. Lodi also has a number of these types of structures, many of which are downtown commercial buildings used by the public. The City Hall is also constructed of unreinforced brick, with some reinforced concrete and steel structural members.

Exhibit 26

HAZARD COMPARISON

OF NON-EARTHQUAKE RESISTIVE BUILDINGS (19)

(Table intended for buildings not containing earthquake bracings, and in general, is applicable to most older construction. Unfavorable foundation conditions and/or dangerous roof tanks can increase the earthquake hazard greatly).

SAFEST

Small wood-frame structures, i.e., dwellings not over 3,000 sq. ft. and not over 3 stories.

Single or multistory steel-frame buildings with concrete exterior walls, concrete floors, and concrete roof. Moderate wall openings.

Single or multistory reinforced-concrete buildings with concrete exterior walls, concrete walls, and concrete roof. Moderate wall openings.

Large area wood-frame buildings and other wood frame buildings.

Single or multistory steel frame buildings with reinforced masonry exterior wall panels; concrete floors and concrete roof.

Single or multistory reinforced-concrete frame buildings with unreinforced masonry exterior wall panels, concrete floors and concrete roof.

Reinforced concrete bearing walls with supported floors and roof of any material (usually wood).

Buildings with unreinforced brick masonry having sand-lime mortar; and with supported floors and roof of any material (usually wood).

MOST DANGEROUS

Bearing walls of unreinforced adobe, unreinforced hollow adobe, unreinforced hollow concrete block, or unreinforced hollow clay tile.

A "windshield" survey of all of the buildings in the downtown area of Lodi was undertaken in order to document the structural building types and structural hazards such as parapets, cornices, architectural ornaments, and other hanging objects. A summary of survey results is in Exhibit 27 Exhibit 28 diagrams the area surveyed with emphasis on the locations of unreinforced brick buildings.

Many of the buildings in the downtown area are older, and therefore, not designed to withstand earthquakes of a magnitude VIII of IX (see page for description) and they may, in fact, be seriously damaged by tremors of less intensity.

Exhibit 27

STRUCTURAL HAZARDS SURVEY - SUMMARY

City of Lodi

1975[1]

Street Location	Unreinforced		Marquee	Probably Unreinforced Brick	Other[2]
	Parapet	Cornice			
Elm Street	5	-	3	1	4
Locust Street	-	-	-	1	-
Main Street	2	4	7	4	11
Pine Street	1	-	1	1	-
Sacramento Street	13	6	8	21	15
School Street	8	3	11	8	20
Total	29	13	30	36	50

[1]Original survey was done in 1975. Summary does not include those buildings destroyed or substantially altered between 1975 and July, 1979.

[2]Other includes awnings, hanging signs, sheds, towers and ornamentaion.

Conditions of the exteriors of the downtown buildings were field checked and photographed, and a record was made of any potential structural hazards found, i.e. poorly reinforced or unreinforced masonry walls, parapets, chimneys, cornices, architectural ornaments, hanging signs and marquees. The fracturing and collapse of facades and ornamental appendages during earthquakes in other areas have accounted for the majority of actual deaths and damage that have occurred.

The City's existing fire station #2, constructed of unreinforced brick, and the Water Works and accessory buildings on North Main Street are considered in extreme need of repair, and would probably be very unsafe in case of earthquake. (49) The City is constructing new facilities at other locations. Future use of the old structures has not been established.

Exhibit 28


DOWNTOWN LODI BUILDING SURVEY
1976
FIRST STREET
DE FORCE AVENUE
LOCKEFORD STREET
LOCUST STREET
ELM STREET
PINE STREET
OAK STREET
WALNUT STREET
LODI AVENUE
CHESTNUT STREET
PLEASANT
CHURCH
SCHOOL
SACRAMENTO
MAIN
STOCKTON
WASHINGTON
PROBABLY UNREINFORCED BRICK
SURVEY AREA

The water tower has not been analyzed by a structural engineer; however, an August 1979 study by Black and Veatch states, ".... The design of the tank does not presently meet any of the structural codes designed to prevent it from collapsing during earthquakes. Our structural staff, in comparing this tank with one similar to it in size, shape and age, has determined that it would not be economically feasible to upgrade the existing tank to meet present codes, and therefore, recommended that the tank be replaced." (101)

ESSENTIAL (KEY) FACILITIES

Essential facilities are those structures or buildings which must be safe and usable for emergency purposes after an earthquake, in order to preserve the health and safety of the general public. (47) As stated in the Uniform Building Code, essential facilities include, but are not limited to:

1. Hospitals and other medical facilities having surgery or emergency treatment areas;

2. Police and fire stations;

3. Municipal government disaster operation and communication centers deemed to be vital in emergencies. (47)

Essential, or key, facilities in the City of Lodi are listed and mapped in Exhibits 31,32.In addition to the aforementioned types of facilities, the City of Lodi includes resident care facilities and emergency and repair equipment storage buildings as essential facilities. In the event of a major earthquake disaster these additional emergency facilities could augment the emergency treatment capacity of Lodi's two major hospitals. In addition to the increased structural requirements for essential facilities, there is the need for these facilities to remain operational in a manner such that earthquake victims can be assisted. This requires greater attention to nonstructural items such as elevators, lighting, fixtures, storage cabinets, etc.

School structures, although not essential facilities by definition, are planned for use as mass care centers in case of emergency (Dam Failure Evacuation Plan-17, and Emergency Plan - 23 and 22). These facilities are listed and mapped in Appendix B . Public school facilities must meet the provisions of the Field Act which essentially states that primary and secondary school structures must be able to withstand minimum resistance to horizontal and vertical forces. (48) Private schools are not required to meet these minimum standards and facilities are not inspected by the State Architect's Office for structural integrity. However, private schools are held accountable for providing the minimum life safety requirements found in the adopted Uniform Building Code. The inspection and compliance of these institutions is the responsibility of the City.

Exhibit 29 lists specific facilities and structures with a description of their function during an earthquake or related occurrences. Described are facilities essential for emergency operations and disaster reaction.

Exhibit 29

SEISMIC RELATED IMPORTANCE OF COMMUNITY STRUCTURES AND FACILITIES

Specific Facility or Structure	I Essential for Emergency Operations and Disaster Reaction	II Structures of Facilities Significantly Affecting Health & Safety	III Structures or Facilities Required for Community Functioning
City Hall	X		X
Police Station	X[1]		X
Fire Stations 1,2,3	X[1]		X
Electrical Substations			X
Electric Utility Lines			X
City Water Wells		X[3]	X
Pipelines (water)		X[3]	X
City Water Tower		X	
Pipelines (sewer)		X[3]	X
Sewage Treatment Plant		X[3]	X
Natural Gas Lines		X	X
Emergency and Repair Equipment Storage Bldgs.	X[2]		X
Hospitals	X[1]		X
Resident Care Facilities	X[2]	X	
Schools		X	
Large Public Assembly Bldgs.		X	
Privately owned Commercial and Office Bldgs.		X	
Dams		X	
Rancho Seco Nuclear Plant		X	

[1]Specifically indicated as "Essential Facility" by the 1976 Uniform Building Code.

[2]Designated as "Essential" by the City of Lodi because of function or emergency relief service they provide.

[3]Possible source of health problems due to contamination potential.

Exhibit 30

LODI AREA ESSENTIAL FACILITIES

Fire Stations

Map #1 — Main Fire Station #1
210 West Elm Street

2a — Fire Station #2
114 North Main Street
(until new station opens on Lodi Avenue)

2b — Fire Station #2
Lodi Avenue at Highway 99
(to replace Main Street Station)

3 — Fire Station #3
2141 South Ham Lane

4 — Fire Station #4 Site
Lower Sacramento at Elm Street
(construction date undetermined)

5 — Woodbridge Fire Dept #1
400 East Augusta
Woodbridge, CA

6 — Woodbridge Fire Dept #2
West Lane at Armstrong Road

Police Station and Emergency Communications

Map #1 — Lodi Police Station
230 West Elm Street

Hospitals

Map #8 — Lodi Memorial Hospital
975 South Fairmont Avenue

9 — Lodi Community Hospital
800 South Lower Sacramento Road

Emergency Repair Equipment Storage

Map #10 — Municipal Service Center
1331 South Ham Lane

Map 2a — Electrical Utility Yard
Main and Locust Streets
(until completion of addition at MSC)

Map #11 — Henning Substation
1401 W. Kettleman Lane

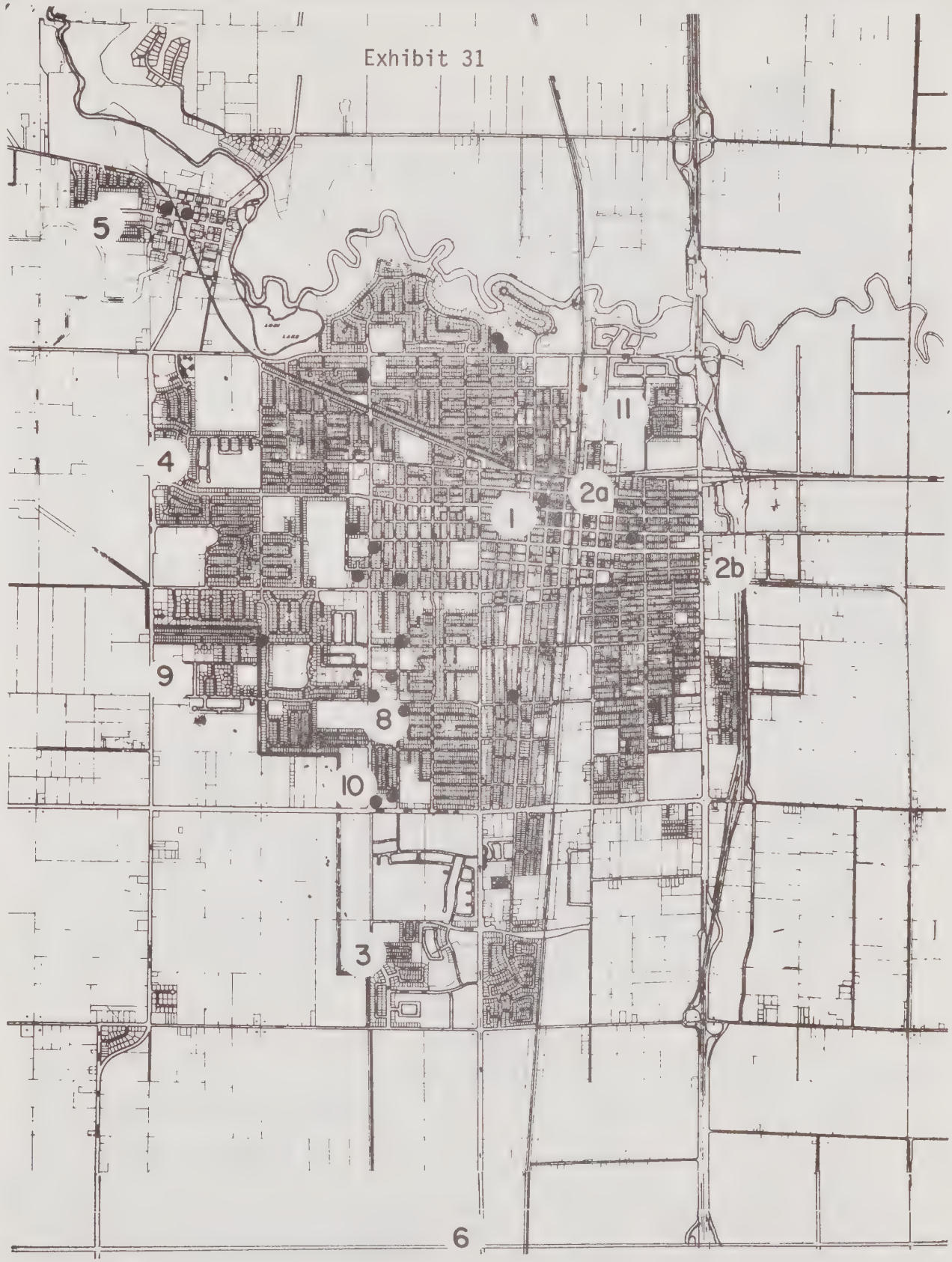
RESIDENT CARE FACILITIES - 6 OR MORE BEDS[1]

- Bechthold Convalescent Home
  610 South Fairmont Avenue
- Fairmont Rehabilitation Hospital
  950 South Fairmont Avenue
- Gross Convalescent Hospital
  321 West Turner Road
- River Garden Retirement Home
  311 West Turner Road
- Mason Guest Home
  209 North School Street
- Aaron Manor Home
  408 East Pine Street
- Ashley Place
  1321 South Fairmont Avenue
- Berndt Guest Home
  2001 West Tokay Street
- Delta Convalescent Hospital
  1334 South Ham Lane
- Sunset Manor Guest Home
  230 South Fairmont Avenue
- Formerly Larry's Guest Home
  32 South Ham Lane
- Vienna Golden State Convalescent Home
  800 South Ham Lane
- Vista Ray Convalescent Hospitals
  1120 Sylvia Drive
- Quality Guest Home
  832 Lakehome
- Jeri's Guest Home
  805 South Church
- Nelson's Board and Care Home
  913 Wellswood
- Smith, Elasan and Sawyer
  72 North Pacific
- Pond's Guest Home
  1330 West Walnut
- Huber's Rest Home
  18759 North Chestnut Street
  Woodbridge
- Victorian Guest Home
  18727 North Lilac Street
  Woodbridge

Map # refers to the location numbers on Exhibit
• Location of Resident Care Facilities on Exhibit

[1]There are a total of 20 facilities with 688 beds. However 9 of these facilities have between 6 and 10 beds and are essentially large houses rather than institutional-type facilities, which are considered similar to hospitals for the purposes of this Element.

Exhibit 31



LODI AREA ESSENTIAL FACILITIES

JANUARY 1980

27 Refers to Listing Number on Exhibit

● Resident Care Facilities

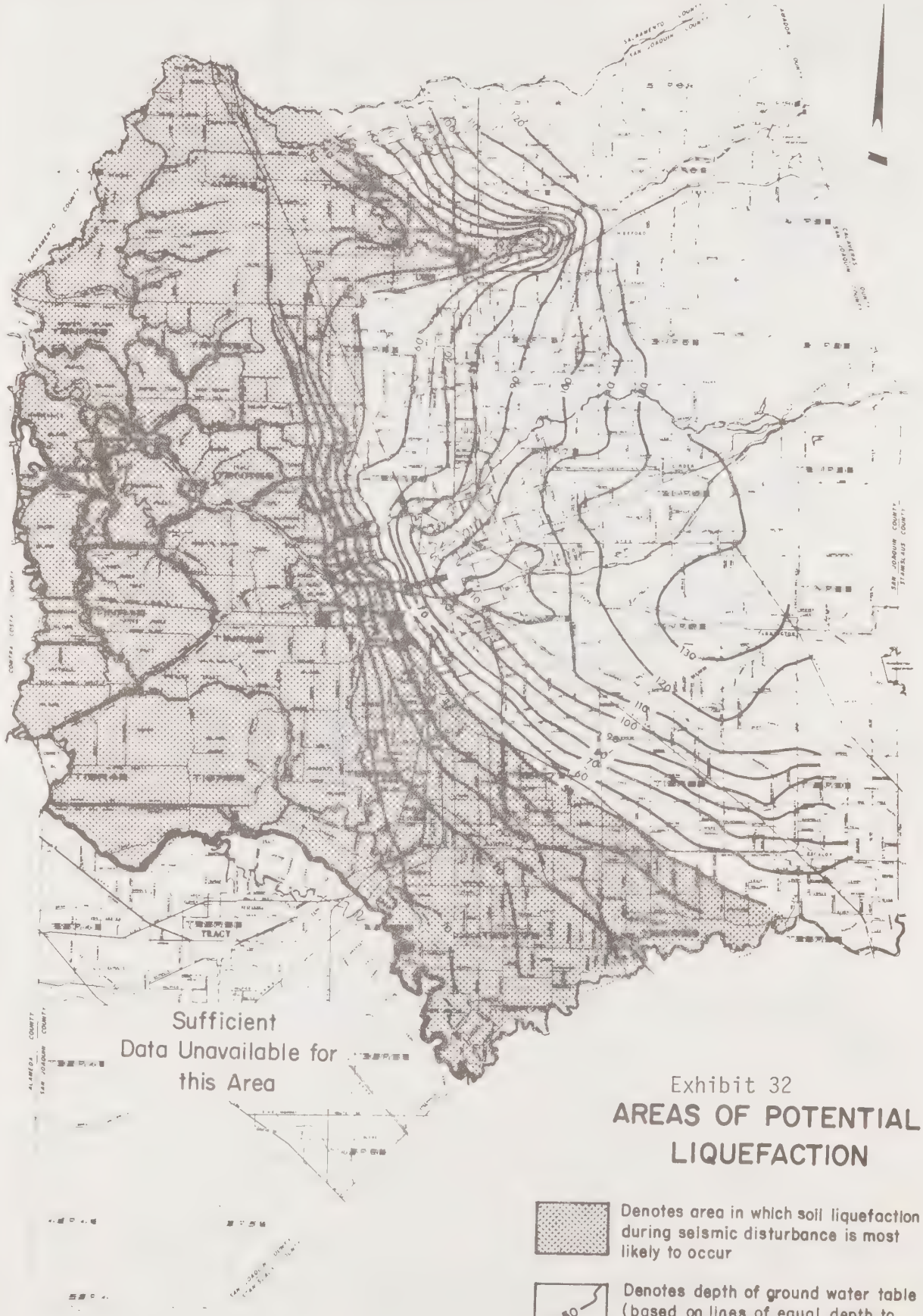


Exhibit 32

AREAS OF POTENTIAL LIQUEFACTION

Denotes area in which soil liquefaction during seismic disturbance is most likely to occur

Denotes depth of ground water table (based on lines of equal depth to water in wells in the Fall of 1977).

BASE MAP PREPARED BY SAN JOAQUIN COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

SAN JOAQUIN COUNTY
SAFETY / SEISMIC SAFETY AUGUST 1978

SECONDARY EFFECTS OF EARTHQUAKES

In addition to general groundshaking, an earthquake can trigger many other actions. These secondary effects can cause as much, if not more, damage than the earthquake itself, particularly if there are a number of things happening at the same time, resulting in a serious disruption or crippling of emergency response.

Liquefaction

Portion of the City of Lodi are within an area in which soil liquefaction during seismic disturbance is most likely to occur (Exhibit 32). Liquefaction is a soil phenomenon in which a water saturated cohesionless soil temporarily loses its strength and liquefies when subjected to dynamic forces such as intense and prolonged groundshaking. If the liquefying layer is a few feet below the surface, it may provide a sliding surface for the ground above it, causing liquefaction.

A great deal of damage in recent earthquakes (Chile, 1959; Alaska, 1964; Nigata, Japa, 1964; and San Fernando, 1971) has been caused by soil liquefaction. When liquefaction occurs, building foundations may sink or tilt into the underlying soil, differential ground subsidence may occur, or landsliding may take place. In the San Fernando earthquake a landslide causing extensive damage was attributed to soil liquefaction. The movement occurred on an average ground slope of two degrees.

The areas which are believed to have the greatest potential for liquefaction are those areas in which the water table is less than 50 feet below ground and the soils are predominantly clean, relatively uniform sands of loose to medium density. The closer the ground water is to the surface, the greater is the potential for liquefaction. An area just west of Woodbridge (including a small portion of the townsite) is considered among the most suspectible locations in San Joaquin County. Liquefaction in the Delta area could cause a levee break and subsequent flooding. The affects of flooding the Delta area, in the City of Lodi, are discussed on pages 27 and 28. This could affect the White Slough Plant.

Whether or not the soil will actually liquefy depends on the amplitude and frequency of the wave motion of the groundshaking and its duration. The looser the soil the shorter the duration and the less intense shaking needed to cause liquefaction. More dense soils will withstand longer durations of shaking and more intense shaking before liquefaction takes place. The type of earthquake motion expected for Lodi, from large earthquakes, is expected to be a long rolling type motion which would be less likely to cause liquefaction. However, if an earthquake were to occur along the Tracy-Stockton Fault, the motion near the fault would tend to

be sharp, high frequency vibrations, a type more likely to cause liquefaction. Although the probability of soil liquefaction actually taking place in Lodi is considered to be relatively small, the possibility still exists and should be considered when planning or designing structures.

The stability of the soil beneath Camanche Dam, in the event of a foothill earthquake, has been questioned. There is concern that liquefaction may occur, prompting possible failure of dam structures. This hazard is undocumented at this time.

Tsunamis

Tsunamis, sea waves caused by seismic activity, pose a negligible hazard to the City of Lodi. However, in the event of a tsunami along the northern Pacific coast, coastal cities may find it necessary to call upon interior cities for assistance.

Seiches and Surges

Seiches are periodic oscillations of water level in basins. Seiches occur not only in confined basins, but also in harbors, bays, channels, rivers or other bodies of water. A related effect is the oscillations that can occur in water tanks during earthquakes. Bulges in steel tanks due to earthquake-induced water forces were noted after the 1906 San Francisco Earthquake.

The period of seiche ranges from a few minutes to a few hours, depending upon the size and shape of the basin of water. The amplitude of a typical seiche ranges from a few inches to several feet.

A related phenomenon, known as a surge, similar to a seiche but having a larger amplitude and generally greater violence, can also occur. Aside from accounts of water tank bulging, there are no historical records of a seiche occurring in or adjacent to San Joaquin County. That does not, however, rule out the possibility of one occurring in the future and the possibility of the City of Lodi experiencing adverse effects. Seismic induced wave action could result in the rupture or collapse of the City water tower (if failure is not an immediate result of groundshaking); damage to levees and banks along the Mokelumne River and Lodi Lake (including Woodbridge Dam) and damage to Pardee Dam and Camanche Dam and Dikes.

Initial groundshaking and possible secondary effects in and around Lodi, caused by an earthquake, could result in damage or collapse of structures, flooding, and/or fire, with all of the associated problems as discussed in other chapters of this Element.

Subsidence

Subsidence is a general lowering of the ground surface over a large area.

Earthquake motion can cause localized subsidence by a settlement or "shake-down" of the soils. This settlement is most likely to take place in areas where the water table is deep (otherwise liquefaction could take place), the soils are of loose to medium density, and the soil profile includes a strata of loose, clean, uniformly graded sand. Insufficient data exists to make definite outlines of areas where "shakedown" is likely to occur. In general, the Lodi-Thornton areas and areas southwest of Tracy are likely places for "shakedown" to occur due to sandy soils. (1)

As with liquefaction, the potential for ground settlement in an earthquake is dependent upon the magnitude, duration and frequency of the earthquake waves. The long rolling earthquake motion, which is most apt to occur in Lodi would be less likely to cause "shakedown" than would intensive high frequency motion. Therefore, the potential for seismically induced ground subsidence can be considered relatively low for the City of Lodi and San Joaquin County. (1)

Subsidence as a result of ground water and natural gas withdrawals in the Lodi area is, at this time, believed to be negligible and is not considered a hazard. However, sustained overdrafting of underground fluids has resulted in subsidence in other areas, including Stockton. Therefore, the possibility of this type of subsidence occurring in the future should not be completely ruled out.

NON-SEISMIC GEOLOGIC HAZARDS

Wind Erosion

The Lodi area is subject to moderate wind erosion hazards where the sandy soils are not covered with structures or vegetation. The Delta area, however, is subject to high wind erosion hazard, which does have an effect on Lodi. Predominant winds are from the west, causing large volumes of the finely particulated peat soils to fill the air and eventually settle over the City. The peat dust is a health and safety hazard and contributes to the loss of agricultural soils. At times, roads through the Delta must be closed due to poor visibility in a peat "storm".

Exhibit 33 illustrates areas of Wind Erosion Hazard.

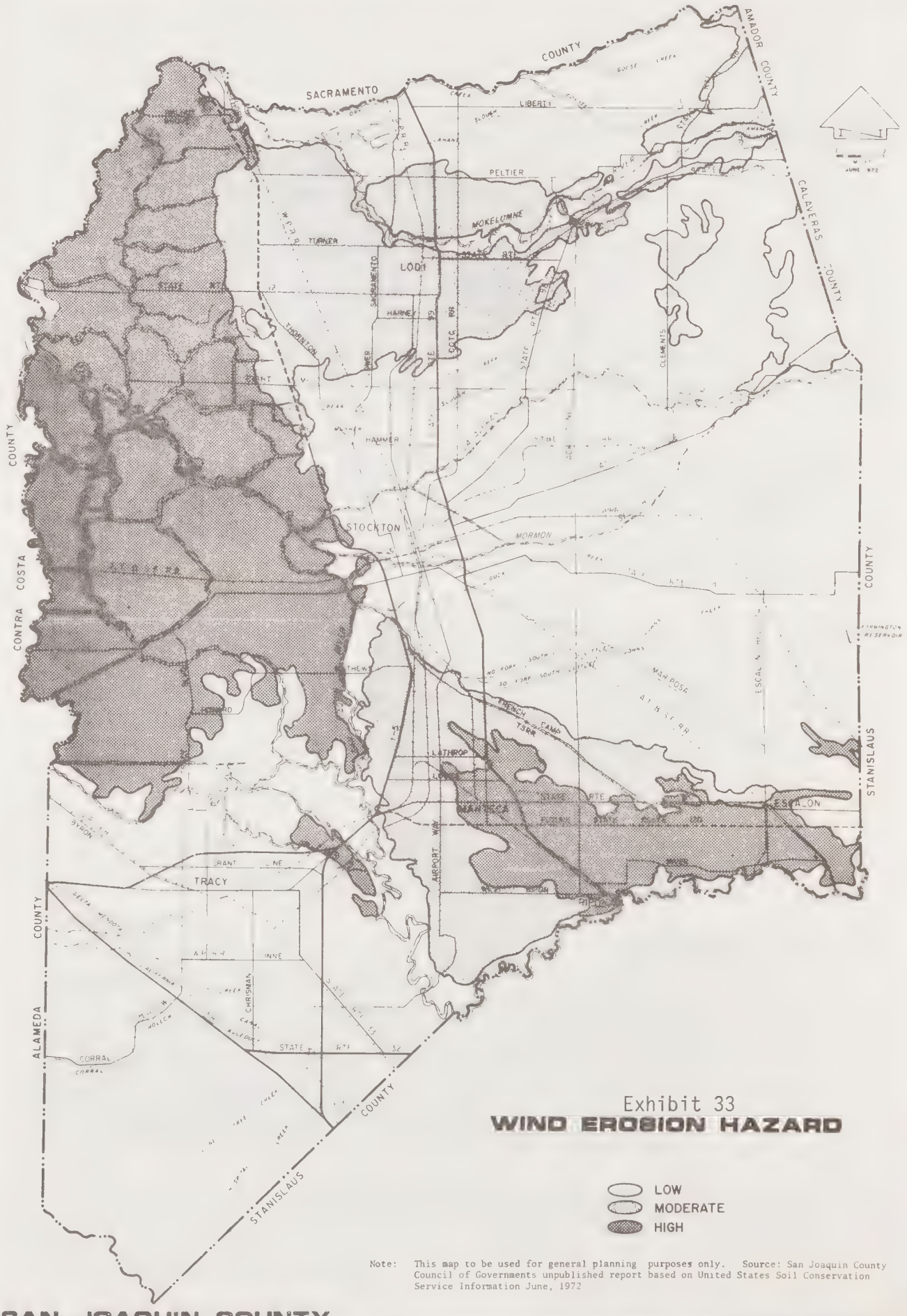


Exhibit 33

WIND EROSION HAZARD

LOW
MODERATE
HIGH

Note: This map to be used for general planning purposes only. Source: San Joaquin County Council of Governments unpublished report based on United States Soil Conservation Service Information June, 1972

SAN JOAQUIN COUNTY PLANNING DEPARTMENT

PROBLEM MITIGATION AND HAZARD REDUCTION

City Responsibility

City government has two basic responsibilities relative to reduction and/or mitigation of seismic hazards. The first is to establish a level of safety which provides protection against loss of life or serious injury to all of its citizens. The second is to insure the continuation of vital services and functions in the event of a major seismic occurrence.

Structural Hazards

Well thought-out and organized education and training programs will yield significant results; however, removal and prevention of potential hazards is also important. Fortunately, to the best of current scientific knowledge, Lodi is not situated on a known fault zone; however, injury as a result of structural damage or failure due to groundshaking is a very real possibility. This possibility is recognized in the Uniform Building Code, adopted by the City of Lodi, which places all of Lodi and San Joaquin County in Earthquake Zone 3. (47) The regulations for this zone are based on the assumption that an earthquake of an intensity of VIII+ on the Mercalli Scale (page 36) could occur.

Earthquake resistant design and construction of new man-made structures is by far the most effective and practical approach to the problem of preventing or reducing loss of life, injury, and property damage, and disruption of the economy caused by earthquakes. However, there is also general agreement among seismic safety experts that an urgent need exists for measures to minimize the serious earthquake hazards which exist in many older buildings. (1) This concern is reflected in past and ongoing actions, such as the Field Act and UBC requirements for defined Essential Facilities (page 52). Many areas have also established rehabilitation and special code enforcement programs.

Section 203 of the Uniform Building Code deals with "dangerous buildings" and allows local government to declare such buildings a public nuisance and abate them. Some communities have appointed knowledgeable committees to make the decisions in such cases. Although abatement is a wise policy, many jurisdictions have avoided this option because of the economic consequences and have concentrated on reducing the hazards of older buildings rather than removing them. Many jurisdictions are requiring reinforcement or removal of parapets, cornices and other ornamentation. (1)

Unfortunately, nearly all of Lodi's structures of historic significance are of unreinforced construction, as is most of the appealing architectural ornamentation. At this time the City does not have a stringent structural improvement program for seismic purposes, nor is there a historical preservation program. As a result, many very interesting buildings have not been altered, which has contributed to the pleasant character of the downtown

area. However, because of the lack of established architectural guidelines, many remodelings to meet minimum building codes have resulted in a marring or destruction of the building's architecturally significant features. It is difficult to attain both goals; however, successful compromise has been reached in many jurisdictions where goals have been clearly identified and policies implemented. The State has also developed an Historical Building Code which can be adopted by local jurisdictions for specified districts. "Earthquake proofing" does not have to mean the loss of other community resources. There are alternative construction techniques that can be employed, as well as the possibility of limiting access or activities.

Earthquake Preparedness

Scientists agree that the question is not whether there will be a major seismic occurrence at any given location in California, but when will it occur and how bad will it be. Therefore, it is imperative that earthquake preparedness be a community concern.

Exhibit 34

EARTHQUAKE SAFETY TIPS (1,53)

BEFORE

1. Store emergency supplies: food, water, first aid kit, flashlight and battery powered radio.
2. Take a practical first aid course.
3. Locate main switches and valves that control the flow of water, gas and electricity into your house. Know how to operate them.
4. Support community programs that inform the public and emergency personnel about earthquake preparedness.
5. Support actions and programs aimed at minimizing earthquake hazards.
6. Take action to help strengthen or eliminate potentially hazardous structures.
7. Support basic research into the cause and mechanism of earthquakes and fault movement.

DURING

1. Don't panic even if you are frightened.
2. If you are indoors, stay there. Get under a desk, table, or doorway.
3. Do not rush outside. Falling debris has caused many deaths.
4. Watch for falling plaster, bricks, and other objects.
5. If you are outside, move away from buildings and power lines; stay in the open.
6. If you are in a moving car, stop as soon as it is safe. Remain in the car.

AFTER

1. Check your family, or the people near you for injuries.
2. Inspect your utilities for damage to water, gas, or electrical conduits. If they are damaged, turn them off.
3. Extinguish open flames.
4. Do not use the telephone except to report an emergency.
5. Turn on your battery-powered radio for emergency information.
6. Don't go sightseeing.
7. Stay away from damaged structures; after shocks can cause the collapse of weakened structures.
8. Stay away from beaches and waterfront areas subject to seismic sea waves (commonly called "tidal waves").

Development of a local public information program by City government, schools or community groups could be very beneficial in helping people to understand what are the potential hazards and what can be done to reduce them. There are many things that individuals, families and groups can do to be prepared for an earthquake and to diminish the effects of an earthquake. Unlike most other natural disasters, such as floods or fires, earthquakes give no warning. It is, therefore, imperative that everyone have a basic understanding of the recommended actions to take before in anticipation of an earthquake. (1) Exhibit 34 , Earthquake Safety Tips, originally published by the California Division of Mines and Geology (53), describes what to do before, during and after the earthquake.

Emergency Response

Quick restoration of interrupted essential public services, including police, fire, water, and power, is of primary public concern and a responsibility of local government. The County Office of Emergency Services is developing an earthquake contingency plan for adoption by local jurisdictions, which should be used as a guide in training emergency personnel for maximum effectiveness in case of an earthquake, and for mobilization of emergency relief efforts.

The City's emergency operations center (and backup center for Stockton and San Joaquin County) is located in the public safety building, which is designed to withstand earthquake tremors. As previously discussed, the ability of the City Hall to withstand the maximum probable earthquake is questionable. In an effort to minimize potential injuries, employees should be instructed on what to do in case of an earthquake during working hours.

CHAPTER 4

FIRE HAZARDS

The Policies and Implementation of this Chapter are based on the Following

ASSUMPTIONS

The City of Lodi assumes that:

- There will always be a need for some level of fire protection, which can best be provided by a municipal fire department;

- Four properly equipped and manned fire stations will adequately meet the fire protection needs of the City as projected for development at this time (June, 1980).

The City of Lodi Adopts the Following

POLICIES

- The City will encourage and support fire prevention program, projects and measures undertaken by the commercial and industrial sector, which are consistent with City policy.

- Fire prevention and related educational programs will be provided by the City.

- The City will encourage and support programs and projects aimed at providing positive activity opportunities for the City's young people.

- The City will actively pursue enforcement of Codes and regulations intended to minimize fire hazards.

- The City will make all reasonable attempts to maintain and improve the City's fire insurance rating.

- The City will obtain and maintain information on existing and potential fire hazards within the City. Appropriate emergency response plans will be included in personnel training.

- High fire load land use activities will be located away from residential areas, where there is an adequate water supply for fire fighting.

- The City will provide minimum fire flows in all developed and developing areas of the City.

- The City will inform builders in new developments that fire protection may be limited as a result of nonexistant or inadequate water supplies on-site and inadequate vehicular access.

- Fire station location and start of construction will be on the basis of the Land Use Element of the City General Plan and criteria established by the Insurance Services Office. New sites will be acquired prior to development of the area in which they are to be located.

- The City will not incorporate, or cause development of, more area than that which can be provided adequate fire protection.

- The Wilderness Area of Lodi Lake Park is recognized as a valuable regional resource; therefore, the City will provide fire prevention measures which maintain the wilderness character of the area.

- The City will support studies aimed at providing solutions to rural fire district problems; however, the City will enter into only those agreements which will maintain, or improve, the level of fire service within the City limits.

- The City will eliminate, or at least minimize access problems.

- The City will support projects that will provide safe housing for the area's seasonal workers.

Based on the Adopted Policies, the City of Lodi will Pursue the Following

IMPLEMENTATION MEASURES

- Continuation of the school fire prevention and public relations programs conducted by the Fire Department.
- Prefire and fire prevention inspections of structures on a regular basis.
- Familiarization of all Fire Department personnel with City and school buildings. Buildings should be reinspected after any remodeling.
- Prefire inspections of new City buildings.
- Construction of the fire station to replace the Main Street station.
- Continued upgrading of the water system to assure at least minimum fire flows in all areas of the City.
- Ongoing support and participation in Mutual Assistance agreements.
- Study of the "Suggested Guidelines for Fire Protection Criteria for Residential Developments" (Appendix A of the Council of Governments' "Safety Element"), and incorporation into City standards and procedures where appropriate.
- Development of a procedure for assuring that developments under construction have a water supply and road access adequate for fire fighting purposes during construction.
- Seek construction of an east-west railroad grade separation in the central area.
- Coordination of emergency plans with all affected agencies.
- City Finance Department to notify Fire Department, and/or Building Department of new business license addresses to facilitate inspections or buildings to assure that they are adequate for the intended use.
- The City will investigate the possibility of amending the Building and/or Fire Codes to require certain types of construction and/or building occupancies to have sprinkler systems or other fire suppression measures for the purpose of limiting fire hazards and maintaining the City's Fire Insurance Rating.

A DISCUSSION ON

FIRE HAZARDS

AFFECTING THE CITY OF LODI

Fires are a persistent hazard to life and property; therefore, there is a constant need to provide fire protection. However, fire hazards can be minimized and, in many circumstances, totally prevented.

LOCAL STATISTICS

Exhibit 35 outlines the number and types of fires, and value of property lost in fires reported in the City of Lodi during 1976, 1977 and 1978.

Exhibit 35 (31)

FIRES IN THE CITY OF LODI 1976-1979

Calendar Year	1976		1977		1978		1979	
Property Value Loss	$246,925		$203,950		$1,778,610		$111,150	
Content Value Loss	$155,035		$ 38,255		$4,086,890		$ 69,790	
Type of Fire	No.	% Total	No.	% Total	No.	% Total	No.	% Total
Buildings	83	27	89	32	73	31	70	31
Grass	82	26	45	16	24	10	27	12
Vehicle	71	23	86	31	91	39	66	29
Refuse	59	19	42	15	41	18	42	19
Outside Structures	11	4	14	5	4	2	13	6
Mobilehomes	1	neg.	1	neg.	0	0	0	0
Unknown	4	1	3	1	1	neg.	7	3
Other	1	neg.	-	-	-	-	1	neg.
Total Fires	312	100%	280	100%	234	100%	226	100%

Despite increased City population and growth, the number of fires over the last four years has decreased; however, this is offset by the high property and content value loss experienced in 1978. During that year there was an increase in serious fires in industrial, commercial and apartment structures, many of which had high fire load contents. The property and content value losses were drastically decreased in 1979.

The figures in Exhibit 35 reflect less than 30% of the total number of calls to which the Lodi Fire Department responded. Men and equipment responded to 959 calls in 1978, 1,052 calls in 1977, and 999 calls in 1976, including resuscitations, special service, smoke investigation, wash downs, and false alarms.

Personnel and Facilities

All land within the City of Lodi receives an urban-level of fire protection provided by the City of Lodi Fire Department. Surrounding areas are within the Woodbridge, Mokelumne and Liberty Rural Fire Protection Districts. Lodi has mutual aid agreements with these Districts and the other fire protection agencies in San Joaquin County. The City currently has three operating fire stations, each manned and equipped to respond to emergency calls within the City of Lodi and to other fire districts under mutual aid conditions.

In April, 1979, the Lodi Department had 51 paid positions (including all levels) and was authorized for 14 volunteers.

Exhibit 36

LODI FIRE STATIONS (30)

Operating Stations	Minimum # on-duty Personnel	Equipment
Station No. 1 210 West Elm Street	7 per shift[1]	1 pickup/pumper 1 engine 1 truck 1 reserve pumper 1 snorkel
Station No. 2 14 N. Main Street	3 per shift	1 engine 1 reserve pumper
Station No. 3 2141 South Ham Lane	3 per shift	1 engine

[1]Excludes administrative personnel and dispatcher-clerk.

First in and backup response areas are shown on Exhibit 37. Average Fire Department response time is 2 to 3 minutes.

The City has a fire station site at Elm Street and Lower Sacramento Road to serve future development in the western and northwestern areas, and a site on Lodi Avenue between Cherokee Lane and State Route 99 to replace the Main Streeet station, which serves the freeway, and the entire east side of the City. This area includes most of the City's industrial development. Construction is scheduled for 1980-1981. The two-story Main Street station is of unreinforced masonry con-

struction which is likely to fail in the event of an earthquake. All fire stations are considered critical facilities (Exhibit 29) in case of emergency or disaster (including earthquakes) and should be capable of functioning. The station's location close to the railroad track is also significant in that there is a possibility of train derailment or other accident on or along the tracks which could damage the station and/or prevent crews from responding in the assigned manner. Personnel are also exposed to extremely high noise levels night and day, which is not only inconsistent with City policy (32), but is also a health hazard. There is no established criteria for scheduling new fire station construction; however, the Insurance Services Office recommends the location of one engine company within a 1½ mile travel distance for residential areas and 3/4 mile travel distance for commercial and industrial areas. (30, 33) These areas are shown on Exhibit 37.

Ratings

Municipal fire protection is rated approximately every 5 to 10 years by the Insurance industry on the basis of a grading schedule prepared by the Insurance Services Office. The City of Lodi, which is scheduled for evaluation in the near future, has a Class 4A rating on a scale of 10. (30) Essentially the lower the number, the higher the rating and the lower the average fire insurance premiums paid by residents, businesses and property owners. Relative values and maximum deficiency points are assigned to water supply (39%), the Fire Department (39%), Fire Service Communications (9%), and Fire Safety Control (13%). (33) Water supply, which is an important component of land use planning and development, is one of the most significant considerations (page 77).

SPECIFIC HAZARDS

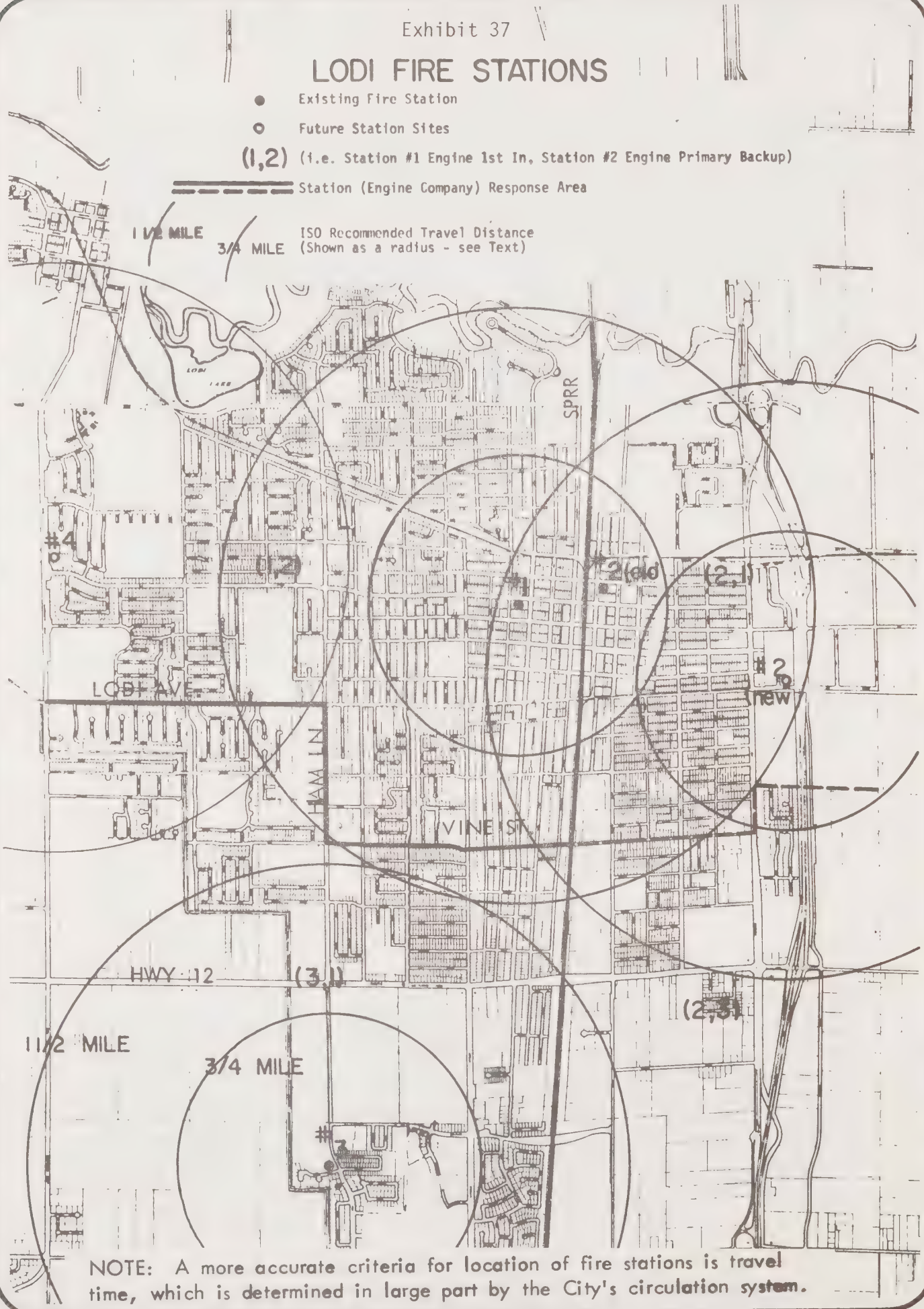
Following is a discussion of specific problem areas and hazards in the City of Lodi. Existing and potential mitigation measures are discussed in the last section of this chapter.

Problem Areas

Fires in the Lodi Lake Wilderness Area and in rubbish dumpsters are generally attributed to children and young people, with a significant increase in incidences prior to the closing of school in May and June, when evenings are hot and people are restless. There have also been incidences of people, primarily young people, entering little used upper stories of commercial buildings through the roof. "Nests" are a fire hazard for a number of reasons, and the chances of someone being trapped in a fire are also increased. (25, 30). Hazardous structures are abated per the Uniform Fire, Housing and Building Codes.

Exhibit 37

LODI FIRE STATIONS



NOTE: A more accurate criteria for location of fire stations is travel time, which is determined in large part by the City's circulation system.

Access

Access and fire location problems in Lodi are minimal compared to other communities; however, problems do exist. Downtown alleys are frequently blocked by delivery trucks during the day, and parked commercial vehicles at various times during the day and night. Residential alleys, which are the only access to some structures, are narrowed by parked vehicles and miscellaneous accumulations. Alley structures are sometimes difficult to locate based on information given by the person calling in the emergency, delaying the effective response time.

Outside storage of products in manufacturing areas frequently prohibits firefighters direct access to structures which can increase the level of potential fire hazard. Access in newer and refurbished mobilehome parks is adequate (if not blocked); however, the few older parks remaining in the City have narrow streets and are not always clearly marked.

Access to specific locations within individual buildings can also be a problem (and extremely hazardous to firefighters) when rooms are constructed, or filled, in a labyrinthine fashion, and passage is blocked by stored items or stock displays.

Train tracks and irrigation canals are the most significant access barriers in the City; however, at this time there have been no major problems in responding to emergency calls, and the chances are small of undercrossings or overcrossings being blocked such that backup emergency vehicles are prevented from reaching a site (3). A train on the east-west tracks could delay response time to the northern area of the City.

Guard dogs and watch dogs are useful in crime prevention; however, they are an increasing problem to fire and rescue personnel.

High Fire Risk Land Uses

The older buildings in Lodi's downtown, like most of those in other California downtowns, are not constructed with firewalls or fire blocks, and are not sprinkled. The potential for a serious fire is increased when portions of the building are vacant or unused for long periods of time. The rise is further increased when flammable goods are stored in basements, upper floors and backrooms. Business inventories are high hazard fire loads. (Contents which will burn rapidly and provide high heat levels). Often, portions of the buildings are used for residential purposes and persons in the buildings are not careful or mindful of potential fire hazards. This problem is a particular concern during grape season when the number of individuals sleeping in downtown buildings drastically exceeds reasonable occupancy (25).

Older wooden produce packing sheds have long been a fire problem in Lodi; however, most have been torn down or destroyed by fire.

Lumber yards, or any business which requires storage of wood products, particularly pallets, mill stock, or paper are a potential fire hazard, especially when located adjoining or near a residential area or in densely built commercial and industrial areas. Many of these businesses also have on-site storage of flammable liquids such as solvents, paints and other chemicals. Chemical manufacturers and distributors, and industries using large amounts of chemicals, are also high risk types of land uses. Many individuals are ignorant of just how hazardous a material or operation may be.
New construction sites with accumulations of wood and other flammable products are an attraction to children as well as arson-prone individuals, and are therefore considered "problem" areas. The sites are left unattended during non-work hours. Access to the sites is difficult if the streets are unfinished and the water system, and subsequently the hydrants, may not be operational.

Transportation

Accidents involving hazardous materials are a possibility on major highways and roads in and near Lodi, and on or along the railroad tracks. A more complete discussion of hazardous materials and transportation hazards is in Chapter 6.

Vehicle fires of all types represent a significant number of the calls to which the Fire Department responds, including fires in parked cars, and as the result of accidents. Automobile accidents frequently result in spilled oil and gasoline which must be washed down to prevent fire. Gasoline and other chemicals which drain off of the street do go into the City drainage system, resulting in not only the pollution of the terminal drainage watercourse but an increased potential of explosion or fire in the system if not adequately controlled and/or diluted.

ANNEXATIONS

As area annexes to the City of Lodi, it is de-annexed from the adjoining fire districts, and the City becomes responsible for fire protection. These areas are frequently without fire hydrants and on-site roadways until time of development, and if not cultivated are frequently overgrown with weeds, resulting in a fire hazard. If the area is large, or some distance from an existing hydrant or water supply, firemen must employ rural-type fire-fighting techniques, for which the urban department is not extensively trained or equipped. This would be an even greater problem if the Lodi Fire Department were to assume responsibility for fire protection in any of the adjoining rural area.

Annexation of the town of Woodbridge is basically consistent with the General Plans of the City and the County. There could be many advantages to Woodbridge residents; however, the rural fire district would be severely impacted with the loss of the property tax income from the higher value properties, while still being required to provide costly

fire protection to the largest remainder of the district. Without adequate income, the rural departments might be forced to cut personnel, further affecting the remainder of the district. This situation would also be true in the cases of other rural centers and areas around Lodi.

Presumably average response times reported by the City will increase with situations where men and equipment are answering a call in a rural area and there is a subsequent call in the urban area or another rural location.

PROBLEM MITIGATION AND HAZARD REDUCTION

Education

Education in the danger of fire is a significant and affordable fire prevention measure, which also stimulates a sense of public responsibility.

The City Fire Department conducts school demonstrations and lectures, as well as regular tours of fire stations for children and any interested groups or individual. Fire science classes are also offered through the school district; however, there is no ongoing program designed to reach all junior high school and high school students, at their level, that bluntly discusses activities such as vandalism, irresponsible use of hazardous substances, and arson.

The problem of boredom and restlessness, which leads to incendiary activities, can be partially mitigated by ongoing recreational and other activities that will divert interests and actions, particularly those of young people, away from a negative direction.

Education of adults can be equally significant, including instruction in the proper handling and storage of hazardous materials, and a program to remind property owners what fires cost, with suggestions on how to curb losses. These could be beneficial supplements to the inspection and enforcement programs. Individually tailored programs might emphasize curbing of losses by locking doors and windows to prevent trespass (including roof openings); storing of all types of items in an "appropriate environment"; avoiding overstocking; maintaining easy and clear access to structures and each room within the structure; installing fire retardant construction, sprinklers, and alarm systems; employing security patrols; and constant supervision of work and storage areas.

Effective response time can also be improved through educational programs such as one that would instruct people how to report an emergency, or information on what kinds of signing and house numbering are clearly visible. It would even be helpful if people were encouraged to learn neighboring house numbers, particularly where there is an alley structure or rear apartment. The system of using one-half numbers or a lettering system for these units can provide emergency personnel with valuable locational information before they reach the scene, but only if the caller gives an accurate address.

Fire drills are another educational experience that conditionally prepares people for an emergency. Fire drills, such as those conducted regularly in schools, should be carried out in all places where people are living, working or meeting.

Education of the public emphasizes fire prevention, while education of fire personnel emphasizes emergency preparedness, quick response, and safety. Regular training sessions are intended to acquaint personnel with the operation of equipment, firefighting techniques, and most important, procedures. Company inspections of residential areas, commercial, industrial and public structures, and buildings under construction are not only a means of assuring compliance with fire codes, but more important, familiarizes personnel with potential hazards in the case of fire. These programs are of direct benefit to the property owner. Unfortunately this is often not recognized until after there is a costly fire.

Code Compliance

The City of Lodi has adopted the Uniform Fire, Building, and Housing Codes, with supplemental regulations included in the City Code. Code Compliance is monitored on two levels. During development, construction, or remodeling plans are checked by the Building Inspector, Fire Chief, and other affected agencies for Code compliance, and conditions are imposed where necessary. Existing situations are monitored by the Fire Marshal, who makes regular inspections with followup enforcement where necessary. However, changes in building occupancies and inventories frequently result in the creation of potentially hazardous situations which are usually the result of ignorance more than negligence. Fire Department and/or building department clearance of business licenses would be an effective means of limiting problems. The Fire Marshal also enforces the weed abatement regulations, a program which has contributed significantly to the decreasing number of grass fires (25). Increased patrol activity has also contributed to the decrease in grass fires, including park patrols in the Wilderness Area of Lodi Lake Park, where there were a number of fires in past years.

Regular enforcement of parking regulations particulary in the alleys, and on-site open storage requirements will minimize access difficulties; however, enforcement is time consuming, costly, and should not be a substitute for individual responsibility.

Setbacks, area coverages, height restrictions and other provisions of the zoning ordinances are imposed not only for aesthetics and orderliness, but as fire prevention measures. In those areas where spacing is not, or cannot be, provided to meet Fire Code requirements, there are structural requirements. This includes rubbish dumpsters, which should be kept away from buildings even when there is a metal lid, as required by code. In some cases dumpsters should be emptied more frequently.

Residential site fire protection criteria was studied, and recommendations set forth in "Suggested Guidelines for Fire Protection Criteria for Residential Developments," prepared for the National Bureau of Standards under contract to the Department of Housing and Urban Development. A copy of the 1974 revision of the report is in the Safety Element prepared by the San Joaquin County Council of Governments, Appendix A. An objective of the study was "to assemble into one document, guidelines for minimum fire safety criteria for residential developments by applying fire protection engineering principles and judgment." (37) Use of the recommendations can provide developers with a single source of concise guidelines relating to fire safety criteria for residential developments. Although not set forth in one document, many of the recommendations are currently implemented by the City, particularly if the project is reviewed by the Site Plan and Architectural Review Committee.

Water

The City's water and fire hydrant system is as important as the fire department in limiting fire losses. In April, 1979 there were approximately 117 privately owned hydrants serving large apartment, industrial, and school complexes, and over 1,010 City hydrants. The City maintains fire hydrants approximately 300 feet apart, in commercial and high density residential areas, and in low density residential areas, 500 feet apart. Developers can be required to install fire hydrants to City specifications to serve new development in areas where there are no hydrants within the prescribed distances (24). Large industrial or other complexes may be required to have on-site hydrant or standpipe systems capable of putting out a minimum water flow.

Chapter 7 discusses the importance of constructing the water system to meet the maximum daily and fire flow needs of the planned land use in an area, and the desirable sizes of water mains. As a minimum City Code requires 8-inch mains in commercial and industrial areas, and 6-inch in other areas. Ideally, the water system should be sufficient to maintain the maximum daily consumption rate plus the basic fire flow, over a period of hours. A 1977 study of the City's water system indicated adequate flows throughout most of the City. The study also states that the fire flow can be maintained in the downtown area; however, a small number of additional hydrants was desirable. Fire flows cannot be maintained in most of those limited areas of the City where distribution lines are less than 6 inches (36). The City is upgrading the distribution system in these areas, including cooperative efforts to extend an additional water line to serve existing wet industry.

It is important that the City evaluate land use density changes in light of the existing and feasible water system, (as well as other aspects of the City's infrastructure such as sewers, drainage and streets) and to assure that fire flows can be attained and maintained. The upgrading program is based on the maximum anticipated land use densities (36). This has particular significance in the older east side residential areas.

City systems must also be capable of draining away the large volumes of water uses in fire fighting. The Fire Department is equipped to pump water out of areas, such as basements, to the street where all of the water drains into the City storm drainage system. In the event of contaminated water, or hazardous material spills the Fire Department will check drainage flow with sand bags. There are also check valves in the City system to prevent contamination of the terminal drainage watercourse; however, not all storm drains have gates. Depending upon the contaminant, large volumes of water may or may not be used for dilution to prevent explosion or fire in the drainage system (Chapter 6). The flow would be diverted to park basins. The Caltrans spill crew prefers that sand be spread on chemical susbtances which can then be swept or shoveled. Procedures for emergencies involving hazardous materials are discussed in Chapter 6.

Other Items

The City's new fire stations and station sites have been located on, or near, major streets, within the projected service areas (Exhibit 37). Irrigation canals, train tracks and other barriers were major considerations in site location. Replacement of the Main Street station will not only provide better coverage of the area east of the tracks, it will also provide a much safer working environment for personnel.

A steady decrease in the annual number of grass fires is attributed to an increase in building activity, and subsequent decrease in the amount of undeveloped property, in addition to increased enforcement. Grass fire problems at Lodi Lake are being alleviated by installation of a water line and improved access.

At the present time policemen are advised to subdue ferocious guard dogs with mace, and firemen are instructed to use the fire hose to hold the dogs at bay. In an emergency where time is crucial, it may be necessary to destroy the dog if all else fails.

Consolidation of rural and metropolitan fire services has advantages and disadvantages as previously outlined. Various approaches are being used in other areas, such as the rural district contracting with the urban department (or City) and that Department absorbing all of the District's manpower and equipment; redistricting to an "urban" area and the remaining "rural" area(s), each served by specialized stations and crews; or consolidation into one Countywide or large area district. The effects of Proposition 13 on fire service are being analyzed. Any reorganization of the fire services should be done in concert with other service area reorganizations, consistent with land use and development policies.

CHAPTER 5

CRIME HAZARDS

The Policies and Implementation of this Chapter are based on the following

ASSUMPTIONS

The City of Lodi assumes that:

- Continued City growth will result in an increase in disturbing and illegal incidents.
- The need for a well-trained City police force and related programs will increase as the City grows.
- Lodi does not have a high crime rate.

The City of Lodi adopts the following

POLICIES

- The City of Lodi will maintain a well-manned and well-equipped police force for emergency preparedness, and for the purpose of law enforcement, crime prevention and safety, and as a crime deterrent.

- The City will support and sponsor programs, activities, and actions which encourage and foster community pride.

- The City will provide future police services to the unincorporated area only in connection with the unified provision of other services, and only if it will not adversely affect the level of service provided within the City.

- The City will encourage and support crime prevention programs, projects and measures undertaken by the commercial and industrial sector, which are consistent with City policy.

- All future land use planning and policy development will consider the possible and probable impacts on the City's crime rate.

- The City will support and sponsor programs which will inform citizens of existing and potential crime problems and their relative degree of hazard. Programs will also be aimed at educating citizens in how to overcome fear and cope with crime hazards in a manner which will not endanger the safety of themselves or others

- The City will not incorporate, or cause development of, more area than can be provided adequate police protection.

Based on the Adopted Policies, the City of Lodi will pursue the following

IMPLEMENTATION MEASURES

- Ongoing analysis of all crime prevention and related programs to determine whether or not they are successful.

- Ongoing sponsorship of programs which emphasize crime prevention and safety.

- Continued Police Department review of all new projects proposed in the City, with emphasis on design or other aspects which might foster or encourage criminal activity.

- Ongoing support and participation in Mutual Aid agreements.

- Continued refinement of interdepartmental procedures for obtaining and maintaining statistical information and up-to-date knowledge of City streets and other "locational" data, i.e. apartment house numbering systems and layout.

- Inclusion of defensible space and other design concepts in appropriate rules, regulations, codes and guidelines of the City.

- Review of the City Building Code for adequacy of its crime prevention security measures.

A DISCUSSION ON

CRIME HAZARDS

AFFECTING THE CITY OF LODI

Crime, particularly major crime, is considered by many to be the most serious threat to individual safety; therefore, crime-related hazards are appropriately discussed in this Element. Since crime is dependent on multiple variables, the emphasis of this discusion is placed on land-use related crime prevention techniques.

CRIME AND CITY GROWTH

The overall number of offenses reported in the City of Lodi by the Police Department have increased since 1969, with major crimes[1] investigated by the Department increasing 300%[2] between 1969 and 1978 (26). The number of calls requiring assistance or some level of investigation has also increased significantly.

These statistics, and the degree of hazard within the City must be considered in perspective. The number of incidents of illegal behavior, and the resultant need for law enforcement, within Lodi is influenced not only by overall social changes, but more directly by the continuing growth of the City. Between 1969 and 1978 there was a 26% increase in population (39), a 20% increase in street miles, a 157% increase in multi-family units compared to a 16.7% increase in single family dwellings, and expansion of the incorporated area to nearly 9 square miles (26). Not only is the number of people increasing, but urban pressures which frequently lead to illegal behavior, and occasions for more people to be affected by this behavior are also increasing.

At the present time the City is divided into 47 statistical reporting districts and five patrol beats. Beat areas are based on a variety of criteria including road alignments, circulation barriers, land use, and ongoing computerized studies such as the number of incidents, number of hours spent in a given area, or number of hours on each incident. The average response time is 3 to 4 minutes. During shifts which are short of personnel, beat areas can be consolidated into less than five for patrol purposes.

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[1] Major crimes include robbery, homocide, rape, assault, etc.

[2] 300+ incidents in 1969 to 1000+ incidents in 1978, equalling a 300+% increase.

The Police Department has 50 sworn officers, including detectives, patrolmen and administrative officers. Officers investigate all police calls, in addition to responding to fire and rescue calls, providing assistance where necessary. The Police Department may also be involved in a variety of other situations, such as temporary licenses, parade permits, traffic escort or City Code enforcement. The Lodi Police Department participates in the mutual aid program.

Protection of the Unincorporated Area

An urban level of police protection is provided for city residents, which is much higher than that provided in the surrounding unincorporated area. Law enforcement in the surrounding unincorporated area, including the centers of Woodbridge, Victor and Henderson Village, is provided by the County Sheriff's Office, which is responsible for law enforcement in the unincorporated area of the entire County. Eventual incorporation of all, or part, of the communities mentioned would be consistent with the long-term policies of the City; however, there is no intention at this time to consider providing any level of police protection to those areas beyond that covered by the mutual aid agreement (40).

LOCAL POLICE PROBLEMS

Lodi is not considered an "unsafe" or "high-crime" community. However, the City is not devoid of problems, either.

Youth Related Problems

Many of the complaints investigated by the Police Department have to do with young people, particularly when they congregate at Lodi Lake Park, in commercial parking lots, or along downtown streets. Use of liquor and drugs, combined with peer and crowd pressure, frequently lead to vandalism, obscene behavior, rowdiness, carelessness and other harmful actions.

The Police Department has found that many of those involved are not residents of the City, but come into town from the rural area, and in some cases from Stockton. This is in part because Lodi is the sub-regional center serving a large rural area, and in part because of the school attendance boundaries. It is felt that lack of community pride is a significant factor (26).

High Density Residential Areas

Many of the incidents investigated by the Police Department are in higher density residential areas. Frequently calls come from neighborhoods undergoing a land use transition from predominantly single-family units to predominantly multi-family, others come from new apartment complexes, and from areas housing large numbers of transient individuals. The latter is a problem faced by all Valley cities which are centrally located in the agricultural areas which are economically dependent upon the transient labor force.

As the number of multi-unit residential buildings increases in the City, it is anticipated that there will be a drastic increase in the number of calls to the Police Department. The ratio of calls per number of individuals in any given area has not been determined; therefore, high density areas cannot be directly compared to low density areas. In addition, complaints of noise, family fights, etc. are more predominant in high density areas because there are more people to disturb. This does not mean that apartment dwellers are noisier, fight more, or are more prone to illegal behavior.

Those areas where residential densities are changing are also the areas where there is likely to be a high percentage of older residents who are generally more susceptible to the criminal acions of others, and are also easily frightened.

Traffic Problems

Traffic and circulation problems ultimately become police problems primarily through enforcement difficulties; however, the problem is usually created at a very early plan or design stage. Traffic problems are discussed in Chapter 6.

Vandalism and Malicious Mischief

Vandalism and malicious mischief are costly problems that are not unique to Lodi. Traffic signs, store fronts, awnings, landscaping, unoccupied structures, new construction, vehicles, equipment, street and park furniture, play equipment, street lights, fences and dumpsters belonging to both the public and the private sector are all prime targets of vandals. There is a particular safety problem when traffic signs are removed or destroyed.

Vandalism is a difficult crime to punish people for because it is hard to catch the culprits in the first place, and when caught it is frequently difficult to prosecute them because of a lack of cooperative witnesses, or miscellaneous technicalities.

Fear

Fear of being the object of violent crime is not only a hazard to the mental health and well being of the frightened individual(s), but it can also become a community problem. Many individuals, out of fear as well as caution, are taking measures to protect themselves from danger that may or may not exist. Many actions, like self defense classes, or mace programs, help build confidence and encourage the individual to assess "emergency" situations when they arise. However, other individuals have taken actions which can, and do, threaten the safety of others. These include ferocious guard dogs (Chapter 4), loaded firearms in the home or vehicle, and boobytrapping. More often than not, those seeking protection with these kinds of measures are not properly trained in their use, and because the individuals are so afraid accidents can easily happen. The more people that are frightened into taking these kinds of actions for one reason or another, the greater the probability of accident.

Fear also keeps individuals from participating in community functions or other activities outside of the home or neighborhood which can contribute to the overall well being of the community.

Local Crime Prevention Programs

At the present time, the City Police Department's most successful community crime prevention efforts are the bicycle safety program, school crossing safety guard program, Hunter Safety, and the Women's Awareness classes. Officers, when requested, will also evaluate the crime susceptibility of individual homes, and industrial and commercial structures. The Neighborhood Watch Program is available; however, past efforts to organize local groups were met with general citizen apathy. In other cities, such as Stockton, the program is very well received and successful.

Local citizen response to various crime prevention programs may be reflective of a number of things. It may be an indication of what most people consider to be a threatening hazard - fear of personal injury and less concern for residential crime, i.e. burglary. Program response may also reflect the effect of more women away from the home - nobody is home during the day to participate in a watch program, and simultaneously there is an awareness of the need for a new level of personal protection and education in what is happening outside of the home. It may also be that those who would benefit most are not being reached - the elderly, homebound and the poor, who are traditionally not organizers or participants, and who often are living in fear of doing anything. It is also

possible that crime hazards are within the acceptable levels of risk of most individuals; therefore, there is no "motivation" to participate in a crime prevention program.

Crime Deterrents and Mitigation of Fear

It is not possible to relieve everyone of their fears, nor should knowledge of existing or potential hazards be withheld from residents. Many of the current programs of the Police Department deal with making residents aware of hazards and what they can do to protect themselves without creating potential accident situations. Many citizen fears are also allayed in just knowing that there are deterrents to criminal activity.

The mere presence of a police force is a valid and strong deterrent to criminal activity. Other deterrents include warning signs, watchmen or guards, guard dogs (which can be a safety problem, see Chapter 4), door and window locks, alarm systems, fencing and window bars. All of these techniques, and others as well, are employed in the City of Lodi, and will continue to be an important part of the crime prevention program; however, there are other aspects of crime prevention as well.

Crime Prevention Through Environmental Design

The above are considered one form of punitive and mechanical prevention strategies (38), which, with corrective prevention techniques, make up the concept of Crime Prevention Through Environmental Design (CPTED), as defined in a Special Report National League of Cities. Following is an excerpt from the report, which was published in the December, 1977 issue of Nation's Cities.[3]

> ".....Crime Prevention Through Environmental Design Projects are aimed principally at crimes such as homocide, rape, robbery, assault, burglary, larceny, auto theft, arson, and vandalism.
>
> "CPTED strategies include three kinds of crime prevention: punitive, mechanical, and corrective. Punitive prevention means creating an environment in which it is apparent that a potential criminal is likely to be detected, apprehended, and punished. Mechanical prevention involves placing physical obstacles in the way of the potential offender to

[3] T. Moody, et al, "A Special Report - Crime Prevention Through Environmental Design.", Nation's Cities, December, 1977, pp. 17.

make it more difficult for him to commit a crime. Locks and window bars are part of mechanical prevention, but equally important are the layout of streets and buildings, the location of community facilities, and other design principles. Corrective prevention is perhaps the most fundamental of the three because it involves eliminating criminal motives.

"These means of crime prevention through environmental design are achieved in four ways: access control, surveillance, activity support, and motivation reinforcement. The key to access control is setting up barriers to prevent unauthorized people from entering an area, primarily through making a building or area less vulnerable to unauthorized entry. The primary aim of surveillance is to keep intruders under observation by means of police patrols, electronic devices, or organized programs among residents and users of an area. Surveillance can be aided by improving street lighting and eliminating visual barriers such as fences, shrubs, and walls. Activity support involves increasing human use of an area by making it more attractive. It might be as complex as building a recreation center or as simple as placing benches in a shopping mall. Activity support enhances surveillance because it increases the number of people in an environment. Activity support does not consist of physical changes alone but can also include activities that foster a spirit of community among residents, such as a flea market or a clean-up day. Motivation reinforcement has two goals: to encourage residents and users of an area to have and enact positive attitudes about their living and working environment and to discourage potential offenders by increasing the risk of apprehension and by reducing the payoff of crime. Altering the scale of a large, impersonal environment to create one that is smaller and more personalized, for example, can give residents more sense of community and security. Improving the quality and attractiveness of houses, schools, and subway cars; organizing occupants; or changing management policy are some other examples. Projecting a positive community image to others is a significant deterrent to criminal behavior. "

A community's commercial areas are also important, and can influence how other aspects of the community are viewed.

"Economic vitality is often very directly related to crime and the crime rate. Abandoned, boarded-up stores provide hideouts for offenders. Unattractive commercial areas decrease the likelihood that new business will come in. They also warn away potential customers.

> As businesses close, there are fewer 'eyes on the street' that would give customers and nearby residents a sense of safety. As unemployment rises, so does the number of street corner loiterers. Fear of crime increases accordingly."[4]

Defensible Space

Defensible Space is another concept very similar to CPTED, where buildings and neighborhoods are designed to achieve the following objectives: (1)

- to promote the proprietary interest of residents in neighborhood or apartment complex activities;
- to permit the identification of suspicious happenings or persons (in part by increasing recognition of neighbors);
- to make it evident to the potential criminal that he or she could be observed and could very likely be apprehended.

The following description of defensible space was taken from the "Crime Hazards" chapter of the San Joaquin County Safety-Seismic Safety Element.(1) The material was originally paraphrased from Oscar Newman's book, Defensible Space. (41)

> "Much crime is crime of opportunity rather than premeditated crime. Thus 'defensible space design', which tends to promote citizen surveillance and action, is an important concept for reducing crime--and it offers an alternative or supplement to locks and bolts or other mechanical devices.
>
> "Design features for the creation of defensible space include the following:
>
> - a visually well defined separation between public and private areas;
> - windows placed for easy resident surveillance of yards, corridors, entrances, streets, and other public and semi-public places;
> - landscaping which permits surveillance of open areas and entryways and does not provide places for concealment;

[4] Ibid.

- design which relates grounds to particular dwelling units in apartment complexes so the residents recognize certain areas as for their use, and take an interest in them;

- delineation of city streets to create territorially defined blocks and areas by closing or modifying existing streets and designing new streets to restrict but not exclude vehicular movement (However, access and adequate turnaround radii for emergency vehicles is important and street patterns should facilitate patrol observation);

- elimination of undefined hallways, particularly double-loaded corridors, shared by a large number of families. Entries and circulation corridors should be designed so that as few families as possible share a common lobby. This facilitates recognition of strangers;

- well-lighted streets, entrances and house numbers;

- well-lighted and windowed apartment stairwells where possible;

- well-positioned apartment lobbies or condominium recreation rooms that can be surveyed from the street;

- location of kitchen and living areas to facilitate surveillance;

- limitation of access into and between buildings so escape routes are fewer and undetected entrance is more difficult.

"Similar defensible space techniques and other security precautions have been defined for other types of uses.

"For Industrial and Commercial buildings the following general design principles can be applied:

- Landscaping, location of buildings, walls, etc., should facilitate surveillance from the street and from neighboring structures and not provide places for concealment.

- The street system should allow emergency vehicle access around the buildings.

- Parking, walkways, etc., should be located where surveillance from streets or from an attendant is possible to reduce worker or customer isolation when walking to and from cars.

- Access to buildings or grounds, groups of buildings, and access between buildings should be limited so escape routes are fewer and entrance is made more difficult.

- Access to roofs by parking structures, pallets, flagpoles etc., should be eliminated or avoided.

- Windows should be held to a minimum on the first flood, if possible, and windows made burglar-resistant.

- Buffer zones (walls, parks, busy streets) should be provided between industrial and commercial areas, and surrounding areas to make it more difficult to escape unseen.

- If possible, areas should be designed so they can be sealed off when not in use.

- Alarm systems should be installed if possible on a zone basis so the entire area does not have to be sealed off in an emergency.

- Street names and building numbers should be well lit for easy identification.

Recreational area design features for crime prevention include:

- good lighting;

- designs which facilitate surveillance from streets and nearby buildings

- location of park buildings and high use activities near streets."

Building Codes

In addition to the above approaches, at least two jurisdictions (the County of Los Angeles and the City of Oakland) have incorporated crime prevention security measures into their building codes. In commercial areas, building codes require certain types of locks on doors and windows, reinforced door jamb construction, hinges with nonremovable pins, door constructions which cannot be kicked or broken through easily, adequate lighting, certain windows made of burglar resistant materials, and locking or securing any hatchways, all vents, air ducts or skylights of a

certain size. In residential areas building codes cover exterior door and door jamb construction, locks for doors and windows, some window constructions (notably louvered windows) and hinges (1).

Local Application of Design Concepts

Not all of the ideas outlined above will work in the City of Lodi, and none of them will work well without a cooperative effort between the City and the Community. Each action must consider the circumstances of the individual situation and the relationship to other considerations. For instance, barred windows may keep intruders out, but they may also block the only means of escape in case of fire. Clear, open, parking lots may discourage loiterers, but this kind of lot is not aesthetically pleasing, which contributes to the erosion of a positive community image.

Current design review practices and policy development, to some extent, include consideration of potential crime hazards. The Police Department reviews new projects, watching primarily for potential traffic problems and specific design elements which might encourage or support criminal activity.

CHAPTER 6

OTHER HAZARDS

The Policies and implementation of this Chapter are based on the following

ASSUMPTIONS

The City of Lodi assumes that:

- In case of accident at the Rancho Seco generation facility, there is the possibility of nuclear material reaching the City of Lodi.

- Environmental pollution, specifically air, water and noise, can be hazardous to the safety and well being of the people of the City of Lodi.

- There are numerous safety hazards which are beyond the scope of this Element, and are, therefore, not specifically covered, but may become increasingly important in the future.

The City of Lodi adopts the following

POLICIES

- The City will encourage and, if possible, facilitate completion of the nuclear evacuation plans for the area surrounding Rancho Seco.

- The City will support and encourage ongoing monitoring of the Rancho Seco facility, and continuing research on how to improve the efficiency and safety of nuclear generation facilities.

- The City of Lodi will review and evaluate all plans for location of nuclear generation facilities within a 50-mile radius of the City.

- Storage and manufacture of very hazardous materials should be located away from populated or environmentally sensitive areas. When necessary to help assure the safety of the people of Lodi, supplemental conditions will be imposed on hazardous, or potentially hazardous operations in the urban area.

- The City of Lodi will continue to improve the safety of railroad street crossings within the City, and encourage improvement of those outside the City.

- Installation of new traffic control devices in the City will be based on documented need.

- Traffic hazards and problems will be identified and reduced.

- All new projects will have adequate vehicle access and parking, particularly in commercial areas.

- Existing and potential pollution hazards will be considered in all pertinent decisions.

- The City will seek to improve hazardous conditions which exist on the Mokelumne River.

- The City will work for the improvement of the safety of railroad operations, within the City area.

Based on the Adopted Policies, the City of Lodi will pursue the following

IMPLEMENTATION MEASURES

- Continued research into the nature and degree of hazardous materials transportation and storage in the City of Lodi, and incorporation of pertinent information and mitigative actions into the Hazardous Materials Plan, and other plans and ordinances where appropriate.

- The City will monitor existing on-street diagonal parking situations in an effort to eliminate such parking in those areas where it is particularly hazardous. Proposals for new areas of diagonal parking will be studied and the potential hazards and benefits carefully weighed.

- Ongoing monitoring of safety considerations on the Mokelumne River and support of appropriate controls.

- Review of all transmission line (including gasline) alignments in and near the City of Lodi.

- Periodic review of the City's parking requirements and standards.

- Formal adoption by City Council action of warrants for the installation of traffic control devices.

- Investigation of the need and desirability of an ordinance restricting the parking and movement on City streets of vehicles carrying potentially hazardous materials.

- The City will request that the Southern Pacific Railroad permit the storage of cars carrying potentially hazardous materials only on sidings outside of the City. The City will work with the Public Utilities Commission and any other organization necessary to impress upon the Railroad the importance of this request. In the absence of a favorable response by the Railroad, the City will attempt to establish a procedure with Southern Pacific officials, whereby appropriate City departments are notified in advance when rail cars containing potentially hazardous materials will be parked within the City.

A DISCUSSION ON

OTHER HAZARDS

AFFECTING THE CITY OF LODI

NON-WAR NUCLEAR HAZARDS

Rancho Seco

The Rancho Seco Nuclear Power Plant is located approximately 15 miles northeast of Lodi in the southeastern portion of Sacramento County. An "accident" at Rancho Seco could result in the release of radioactive material by water, or more likely, by atmospheric dispersal. The probability of a nuclear accident is questionable, and the potential effects of such an accident (as well as the dangers of daily operation of a nuclear plant) are currently being disputed; however, in case of an accident, under the right conditions, there is the possibility of nuclear material reaching Lodi. This would depend primarily on the magnitude of the accident, and wind direction. According to the Rancho Seco Meteorological Tower, the wind blows towards Lodi 2.5% of the time. During those times the mean wind speed is 5.5 miles per hour. Predominant winds come from the west; therefore, there is continuous off-site monitoring in Ione and Herald.

Evacuation

Rancho Seco is owned and operated by the Sacramento Municipal Utilities District (SMUD), which developed the Sacramento County Emergency Plan AP 500 in 1974 for action and evacuation in case of an accident at the plant. This plan currently calls for evacuation of all persons within a five-mile radius; however, at the direction of the Nuclear Regulatory Commission (NRC) new plans are being developed for evacuation within a ten-mile radius. According to the Reactor Safety Study (RSS, Wash.-1400), or Rasmussen Report, the radius of evacuation should be 25 miles, which would encompass the City of Lodi. The San Joaquin County Office of Emergency Services is currently working on nuclear evacuation plans for San Joaquin County, including the City of Lodi.

Evacuation is undertaken when there is the possibility of members of the general public receiving a dose rate of more than 500 mrem of radiation to the whole body. Evacuation locations are established by radiation surveys. If the dose rate exceeds 2 mrem per hour, the area will be evacuated. Exposure to radiation is serious. There are two kinds of effects which radiation has on a person. The first is somatic - those effects which impair the health or shorten the life of the one exposed. The second effect is genetic - the mutation of genes of the exposed individual. Genetic effects can be transmitted to the offspring.[1]

Waste Storage

High level, solid nuclear waste is currently being stored at the Rancho Seco facility, where space should be adequate until 1985, at which time modifications will be necessary to increase the storage capacity, or, if possible at that time, shipment of waste to a government waste disposal/ storage facility may commence. At present, nuclear waste stored at Rancho Seco does not increase the level of radioactivity above the .01 mrem per year (5) which is the level present during normal plant operations. However, shipment of the waste could present greatly increased hazards.

Nuclear Material Transportation

Nuclear material is transported through San Joaquin County and the City of Lodi, not only to Rancho Seco, but also to hospitals, educational and research facilities, military bases and industrial users which have a "use permit" from the State Department of Health. In the event of a truck or rail accident there is the possiblity of radiation leaks and subsequent contamination. Fire and Police Department personnel are trained to handle accidents involving radiation in accordance with County and State emergency plans. The City Fire Department Training Officer will assume the responsibility of Chief Radiological Officer, charged with management of the Radef monitoring station system, in the event of a radiological accident in Lodi. Such accidents could result in the evacuation of large areas of the City and those outlying areas upwind from the accident.

Slightly enriched uranium fuel is shipped to Rancho Seco from Lynchburg, Virginia five times per year. This fuel is not highly radioactive - less than .01 mrem per hour at six feet from the truck. An individual who spends three minutes at an average distance of three feet from the truck might receive a dose of about 0.02 mrem per shipment (57).

Low level nuclear waste, which consists of everything except the fuel itself, is shipped to Beatty, Nevada, for land burial. The shipment to the Nevada burial site passes through Lodi on State Route 99. Individuals who spend three minutes at an average distance of three feet from the truck might receive a dose of as much as 1.3 mrem (57).

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[1]mrem, or millirems, are the units of measurement for radioactive particles. There are three types of radiation - alpha, beta and gamma. Alpha particles are excited atoms, readily stopped by the tiniest of materials, such as a sheet of paper. Beta radiation is composed of fast moving electrons, and gamma radiation is high energy electromagnetic radiation, such as that in medical or dental X-rays. The average American receives between 145 and 200 mrem per year from all sources (50). The critical level of gamma exposure for the whole external body is 500 mrem (50).

HAZARDOUS MATERIALS

Transportation

In addition to nuclear products, other hazardous materials are transported on roadways and railroads in the City of Lodi. Although extremely hazardous and toxic substances routinely pass through the area, the extent and degree of this hazard is not precisely known by any agency (1). There is a possibility of accident, which could result in the spillage and/or explosion of hazardous gases, liquids and solids in or near the City of Lodi.

At the present time, the transportation of hazardous materials is regulated by various agencies. Liquefied petroleum gas is regulated by the California Division of Industrial Safety, flammable liquid by the State Fire Marshal, and other materials by the California Highway Patrol (1). Explosives in transit by truck are regulated by the U.S. Department of Transportation National Safety Standards. The national standards have been incorporated into the California Vehicle Code and Health and Safety Code. Explosives and corrosives may only be transported on routes established by the local jurisdiction and Caltrans. (99) The California Highway Patrol issues citations for route and other violations. In addition, safe stopping and safe parking places are established by the California Highway Patrol and are set forth in the California Administrative Code. Lodi Truck Service on Cherokee Lane is a designated "safe parking place" which means trucks loaded with explosives can be parked there for longer periods of time, i.e. overnight, and the driver need not be in attendance. Melhaff Trucking on South Stockton Street is also listed in the State Administrative Code as an authorized stop for tire and minor mechanical repairs.

The threat of a major accident or spill of a toxic or flammable liquid with a resulting fire on a residential street is very real. Lack of controls on truck and trailer parking or travel in the City leaves many neighborhoods vulnerable to this threat. Gasoline tank trucks, dual trailers of anhydrous ammonia and other hazardous chemicals are regularly parked on city streets in a 24-hour period. The condition is an evident matter in neighborhood deterioration. (102)

In addition to the railroad, approved explosives routes through the City of Lodi, at this time, are Highway 12 and State Route 99. Bridges have individual requirements for the passage of corrosive and flammable materials.

Regulations are also applied to labeling, packaging, and loading of explosives, safety equipment on trucks and signing for public information. Permits are granted to trucking companies and can be revoked if violations are found. The limits of CHP manpower do not permit high levels of enforcement. No more than random spot checks are possible, yet numerous citations are issued. Truck drivers are required to be provided with detailed written information on how to deal with the specific material being carried in case of an emergency. (1) A Map of Explosives Transportation Routes and safe stopping and parking places is in the San Joaquin County Safety Element.

The Southern Pacific Railroad transports munitions (some of which are transported through Lodi), to the Concord Naval Weapons Station in Contra Costa County. Rail shipment of explosives is not required, but is normally maintained to the standards of the U.S. Department of Transportation for special car design and safety procedures for loading and switching. The railroad companies have initiated the practice of placing munitions cars on non-stop trains through populated areas. The railroad also carries a variety of other types of hazardous materials, particularly agricultural chemicals. At times loaded cars are parked at sidings in the downtown area. In case of emergency, the Fire Department can phone the Southern Pacific Railroad Company and give an assessment of the situation, and specific car number and its location in the train. Railroad personnel will evaluate the problem in relation to car content information from the computer, and provide the Fire Department with instructions.

Fire Department personnel, who would probably be the first to respond to an accident involving hazardous materials, receive regular training in handling such accidents. In addition, the Fire Department is developing a Hazardous Materials Emergency Plan for the City, which will outline procedures and give information on how to determine and get whatever additional assistance may be needed. Caltrans has primary responsibility for state highways and is available for assistance (99).

Each fire engine carries an emergency action guide published by the U.S. Department of Transportation, that lists a variety of hazardous materials, the potential hazards in case of an accident, action information, and recommended evacuation areas and distances if necessary. The guide states, "Evacuation distances are provided to reduce the danger of flying fragments caused by an explosion. Explosions have occurred from two minutes to 48 hours after a tank car or tank truck involvement in a fire. The maximum reported fragment distance from an exploding tank car is 4,900 feet. A 100 per cent safe evacuation distance is some distance greater than 4,900 feet, but may not be practical to attain. At a distance of 2,000 feet, the estimate is one fragment-caused fatality per 100 incidents. The probability increases greatly at shorter distances. An evacuation radius should be enlarged as time permits." (35) Evacuation may also be necessary in case of spills involving gaseous material.

Exhibit 39 is a copy of a typical section from the 1976 Guide. The guides are updated regularly. In addition, there is a toll-free number that emergency personnel can call for information on how to handle a particular accident.

Manufacturing and Storage

The storage and manufacturing of hazardous materials is not only necessary for agricultural and industrial applications, but also for the production of numerous good commonly used by consumers. The complete prohibition of such activities is not possible; therefore, to assure the safety of life and property, regulation is necessary. This is accomplished through specific State and Federal requirements, land use policy and implementation measures such as zoning, codes, and ordinances.

The most effective prevention of serious consequences of an accident at a facility manufacturing or storing hazardous materials, is location of that facility away from potentially conflicting land uses. Extremely hazardous industries should be located outside of the urban area, away from public facilities and sensitive environmental areas, while less intense uses can be satisfactorily accommodated in the urban area if some degree of isolation is provided. Location should also consider environmental influences such as predominant wind direction, drainage and the water table, as well as the land use policies of other affected jurisdictions.

At the present time, in the City of Lodi, storage of flammable liquids in outside, above ground storage, is prohibited in all areas of the City unless they are zoned C-2, C-M, M-1 and M-2, and storage of explosives and blasting agents, and bulk storage of liquefied petroleum gases is prohibited in all areas except in the C-M, M-1 and M-2 zones. Storage must be consistent with the Uniform Fire Code, which is adopted by the City. Other conditions may also be imposed on an individual basis for those uses requiring a use permit. Such storage is monitored by the City Fire Marshal.

The transportation and storage of agricultural chemicals is a particular concern in Valley communities, including the City of Lodi. Most businesses storing these chemicals are located in industrial areas, near the railroad tracks, and are periodically inspected by the Fire Department. Agricultural, as well as other types of chemicals, including paints and solvents, are common commodities in many retail stores and nearly all homes in the City. The Fire Department periodically inspects most commercial buildings in the City, providing owners and business people with information on proper storage; however, homes are seldom, if ever, checked and few people are concerned with the proper storage of easily obtained chemicals.

Ingestion of poisons by children (and occasionally adults) is, unfortunately, a persistent problem. In addition to local medical facilities, residents in the Lodi area can call the:

POISON CONTROL CENTER IN SACRAMENTO AT 800-852-7221

Exhibit 38

TRANSPORTATION HAZARDS

Trains

The addition to the train cargoes, the trains and tracks themselves pose an increasingly significant safety hazard in the City. At the present time there are only two grade separations, or undercrossings, in the City. Kettleman Lane, serving the southern portion of the City and Turner Road at the north end of the City. The ultimate plan for Century Boulevard is a grade separation at the tracks; however, it is not in any street plan for the forseeable future. The City also has much of the right-of-way required for a grade separation at Harney Lane. In addition to the direct

EMERGENCY GUIDE-HAZARDOUS MATERIALS

Ammonia

(Nonflammable Gas, Corrosive)

Potential Hazards

Fire: —May catch fire.

Explosion: —Container may explode due to heat of fire.

Health: —Vapors extremely irritating. Contact may cause burns to skin and eyes. *If inhaled, may be harmful.*
—Runoff may pollute water supply.

Immediate Action

—Get helper and notify local authorities.
—If possible, wear self-contained breathing apparatus and full protective clothing.
—Keep upwind and estimate *Immediate Danger Area.*
—Evacuate according to *Evacuation Table.*

Immediate Follow-up Action

Fire: —**Small Fire:** Dry chemical or CO_2.
—**Large Fire:** Water spray or fog.
—Move containers from fire area if without risk.
—Cool containers with water from *maximum distance* until well after fire is out.
—Stay away from ends of tanks.

Spill or Leak: —Do not touch spilled liquid.
—Stop leak if without risk.
—Use water spray to reduce vapors.
—Do not put water on liquid ammonia pool.
—Isolate area until gas has dispersed.

First Aid: —Remove victim to fresh air. Call for emergency medical care.
—If victim is not breathing, give artificial respiration. If breathing is difficult, give oxygen.
—If victim contacted material, immediately flush skin or eyes with running water *for at least 15 minutes.*
—Remove contaminated clothes.
—Keep victim warm and quiet.

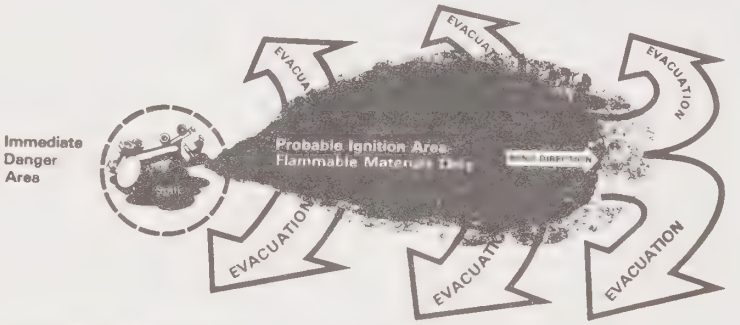
Additional Follow-up Action

—For more detailed assistance in controlling the hazard, call (Chemical Transportation Emergency Center) toll free
You will be asked for the following information:
- Your location and phone number.
- Location of the accident.
- Name of product and shipper, if known.
- The color and number on any labels on the carrier or cargo.
- Weather conditions.
- Type of environment (populated, rural, business, etc.)
- Availability of water supply.

—Adjust evacuation area according to wind changes and observed effect on population.

Water Pollution Control

—Ammonia is water soluble and can kill fish. Prevent runoff from fire control or dilution water from entering streams or drinking water supply. Dike for later disposal. Runoff to storm sewers or sanitary system is acceptable if a water deluge and/or flooding is possible. Notify Coast Guard or Environmental Protection Agency of the situation through Chemtrec or your local authorities.



Evacuation Table — Based on Prevailing Wind of 6-12 mph.

Approximate Size of Spill	Distance to Evacuate From Immediate Danger Area	For Maximum Safety, Downwind Evacuation Area Should Be
200 square feet	40 yards (48 paces)	1,056 feet long, 528 feet wide
400 square feet	60 yards (72 paces)	1,584 feet long, 1,056 feet wide
600 square feet	80 yards (96 paces)	2,112 feet long, 1,056 feet wide
800 square feet	90 yards (108 paces)	2,112 feet long, 1,584 feet wide

In the event of an explosion, the minimum safe distance from flying fragments is 2,000 feet in all directions.

NOTE: THIS SAMPLE PAGE IS TAKEN FROM THE 1976 EDITION OF THE HAZARDOUS MATERIALS EMERGENCY ACTION GUIDE, PUBLISHED BY THE UNITED STATES DEPARTEMENT OF TRANSPORTATION, NATIONAL HIGHWAY SAFETY ADMINISTRATION USE OF THE GUIDE IS EXPLAINED IN THE TEXT.

benefits of separating train traffic from vehicles, cyclists, and pedestrians, grade separations also improve traffic flow and emergency vehicle access as described in Chapters 4 and 5. Although a central city grade separation would be desirable, it would require a major acquisition of property, much of which is developed, thereby necessitating relocation or reorientation of some businesses. In addition, street access to some parcels would become very complicated and other streets would become deadends, affecting the overall traffic flow.

The primary areas of conflict are at those streets crossing the main Southern Pacific Railroad right-of-way running essentially between Sacramento and Main Streets as discussed below. Other lesser crossings in the City, and those streets with tracks in the middle of the payment, are carefully watched when trains are present. As a result, with the exception of the spur to General Mills crossing Turner Road, the latter presents more of a nuisance than a safety hazard at this time.

Between January, 1968 and March, 1979 there were 109 accidents, with 11 fatalities, at Lodi's main railroad crossings. (64) Most of the fatalities were pedestrians or bicylists. In October, 1979, the Administrative Law Judge, acting on behalf of the California Public Utilities Commission, held a two-day hearing on the closure of downtown crossings. The Public Utilities Commission concurred with the findings of the Administrative Law Judge and ordered closure of the Walnut and Oak Street crossings and the installation of drop-down gates and improvement of pedestrian access and protection at the remaining six crossings: Lockeford, Locust, Elm, Pine and Tokay Streets, and Lodi Avenue. The City has budgeted funds for the gates and associated lighting. The Southern Pacific Railroad Company was also ordered to improve the condition of the crossings.

Closure of additional downtown crossings would minimize the conflicts between the street users and the trains; however, it would further isolate the east side residential, industrial and commercial areas from the downtown and would further hamper the flow of emergency vehicles to and from the area west of the railroad tracks. However, additional closures would facilitate downtown rail switching operations.

It appears that the Southern Pacific Railroad Company no longer plans to move the train switching operations south of Kettleman Lane; therefore, the hazards of downtown switching will continue. However, the gates should prevent many of the accidents related to the switching operations, such as those which occur when there are multiple trains or when a train reverses direction.

Roads and Streets

Traffic hazards are an important consideration in all communities, and are one type of hazard to which nearly every person is constantly exposed. In addition, nearly every person has some opinion on what are the most hazardous situations-opinions which may, or may not, be based on cumulative facts, but which almost always have strong emotional roots.

Based on the findings and recommendations in a 1977 analysis of the City's traffic safety programs, prepared by the State Office of Traffic Safety, and the December, 1977 report of George S. Nolte and Associates, entitled Identification and Surveillance Study of Accident Locations, the following are noted as the primary traffic hazards at this time in the City of Lodi.

Most of the City's streets, excluding the newer subdivisions, are layed out in a standard grid pattern, with numerous uncontrolled intersections. There is considerable potential for traffic accidents at these intersections, considering that there are 12 basic traffic movements at each one, and that the streets are almost all through-streets. Despite the potential, the number of accidents is surprisingly low. This is attributed to the fact that many of these streets carry primarily local traffic and most residents are very watchful. Lights and signs have been helpful at certain intersections; however, controls at every intersection are not necessarily the best alternative.

> "The fact is that unwarranted 'STOP' signs do not significantly reduce speeds on residential streets, except for the immediate vicinity of the 'STOP' sign. There is some evidence that midblock speeds are increased with unwarranted 'STOP' signs. Studies have shown the area of influence to be very short. Vehicles have usually accelerated to near their top speed by the time they are 100' downstream of a 'STOP' sign. It must also be recognized that the misuse of 'STOP' signs breed disrespect for traffic control devices in general, thereby creating a more hazardous situation. Placing a device that gets violated in wholesale fashion does not foster either attentiveness or safety on the driver's part.
>
> "The environment is a very real concern today. It would be recognized that unwarranted stops increase air pollution, noise pollution, and fuel consumption." (66)

Exhibit 40 lists accident rates for 1974-1976 for many of the City's intersections. There are far more accidents per number of vehicles at the intersection of Elm and Sacramento Streets than any of the other intersections. In addition to other factors, this may, in part, be due to the higher number of non-local drivers in that area. Discontinuous alignment of traffic lanes at intersections, such as Church Street and Lodi Avenue, contributes to the traffic hazards. A pattern of accidents has been identified at many of the intersections, and specific recommendations for physical improvements have been set forth in the Nolte Report.(67)

Exhibit 40

Accident Rates 1974-1976
Selected Intersections in the City of Lodi

Location	Accidents per Million Vehicles	Number Accidents	Location	Accidents per Million Vehicles	Number Accidents
1. Elm & Sacramento	7.51	42	30. Lodi & Sacramento	1.38	27
2. Daisy & Pleasant	4.85	16	31. Hutchins & Lockeford	1.38	18
3. School & Vine	4.30	19	32. Cherokee & Pine	1.38	29
4. Pine & School	3.52	36	33. Stockton & Tokay	1.37	14
5. School & Walnut	3.34	33	34. Crescent & Lodi	1.30	29
6. Pine & Sacramento	3.33	48	35. Church & Walnut	1.30	13
7. Oak & School	3.05	29	36. Sacramento & Locust	1.29	12
8. Locust & Central	2.86	14	37. Cherokee & Victor	1.24	30
9. Elm & Stockton	2.83	17	38. Oak & Sacrametno	1.13	13
10. Cherokee & Kettleman	2.61	44	39. Kettleman & Stockton	1.11	16
11. Central & Lodi	2.58	29	40. Oak & Pacific	1.10	18
12. Locust & Washington	2.55	14	41. Ham & Lodi	1.05	30
13. Church & Lodi	2.49	44	42. Hutchins & Vine	1.05	12
14. Lodi & School	2.43	54	43. Lockeford & Main	1.04	12
15. Lockeford & Stockton	2.43	27	44. Pine & Stockton	1.01	13
16. Elm & School	2.38	21	45. Cherokee & Locust	0.98	16
17. Church & Oak	2.36	26	46. Lodi & Orange	0.94	17
18. Locust & Main	2.26	16	47. Ham & Lockeford	0.92	18
19. Lower Sacramento & Turner	2.24	23	48. Church& Lockeford	0.92	13
20. Church & Pine	2.15	25	49. Cherokee & Lockeford	0.89	18
21. Hutchins & Kettleman	2.10	51	50. Turner & California	0.87	12
22. Lodi & Stockton	1.99	33	51. Hutchins & Tokay	0.85	12
23. Lockeford & Sacramento	1.97	27	52. Cherokee & Vine	0.82	12
24. Cherokee & Lodi	1.74	40	53. Lodi & Pleasant	0.72	15
25. Church & Kettleman	1.65	44	54. Ham & Kettleman	0.68	14
26. Lodi & Washington	1.60	21	55. Fairmont & Lodi	0.67	12
27. Hutchins & Lodi	1.58	42	56. Ham & Pine	0.66	12
28. Church & Tokay	1.44	21	57. Lee & Lodi	0.62	13
29. Lodi & Mills	1.39	22	58. Lodi & Rose	0.61	14

Source: George S. Nolte and Associates, Identification and Surveillance Study of Accident Locations, City of Lodi, December, 1977, Table C. Accident patterns at each intersection as also diagrammed in this publication.

Exhibit 41 lists the distribution, by cause, of injury accidents in Lodi during 1976, and the cause distribution for injury accidents Statewide. Right-of-way has been listed as the Primary Collision Factor for 22.4% of the injury accidents that occurred in Lodi in 1976. This is compared to 16.5% Statewide. It is interesting to note that the percentage of accidents in the City of Lodi, as a result of speed is almost half that Statewide.

Exhibit 41

CAUSE OF INJURY ACCIDENTS 1976 (66)

Injury Accident Cause	Lodi % Total	Statewide % Total
Driving Under Influence	10.6	11.4
Speed	10.6	19.8
Right-of-way	22.4	16.5
STOP Signs/Signals	6.5	7.6
Improper Turning	2.9	4.3
Following too Closely	4.1	3.3
Wrong Side of Road	2.4	3.3
Other Improper Driving	7.8	8.7
Unknown	17.1	8.2

Figure 42 , from the 1976 Statewide Integrated Traffic Records System (SWITRS), lists fatal and injury accident rates for Lodi and selected Valley cities.

Exhibit 42

FATAL AND INJURY ACCIDENT RATES (66)

City	Fatal Accidents	Injury Accidents	Population	Rate/ 1.000 Pop.
Lodi	3	245	32,150	7.7
Manteca	1	131	17,500	7.5
Merced	4	295	30,300	9.9
Stockton	16	1,209	118,500	10.3
Tracy	2	107	16,050	6.8
Turlock	0	113	18,350	6.2

Exhibit 43 gives a distribution of drivers involved in accidents in Lodi, by age, during 1976. The State Office of Traffic Safety report states, "Realizing the limitations of comparing the small sample with Statewide, attention is drawn to the 15-19 year group and the "Over 64" group. The "Not Stated" group in Lodi is also larger than the Statewide, and if accurately distributed, could affect some other age category." (66) Accidents involving pedestrians in the "Over 64" group is also double

that for the entire State. It is felt that this probably reflects a higher than average number of persons in that age group in the overall community population. It may also indicate the need for specialized safety programs, directed at senior citizens.

Exhibit 43

ACCIDENT VICTIMS BY AGE (66)

	LODI		STATEWIDE
Age	Number Involved	% Total	% Total
0-14	2	0.1	1.9
15-19	450	21.8	16.6
20-24	339	16.4	19.4
25-29	205	9.9	14.5
30-34	127	6.2	9.8
35-39	98	4.8	7.0
40-44	93	4.5	5.8
45-54	189	9.2	10.5
55-64	157	7.6	7.1
Over 64	216	10.5	4.8
Not Stated	185	9.0	4.3

Although the City of Lodi is a pleasant place for pedestrian and bicycle travel, figures indicate that the percentage of pedestrian and bicycle accident victims (5.8% and 4.7% respectively in 1976) (66) is comparable to Statewide figures. Compared to the State figures, however, a disproportionate number of the pedestrian victims are women, preschool age children, and the elderly as discussed above. The number of bicycle victims for 1976 was lower than average. The success of bicycle safety programs for school-age children appears to be reflected in the statistics.

"Also contributing to the City's accident problem, congestion, and potential for accidents are the locations where diagonal parking is permitted (primarily along portions of Central Avenue and Cherokee Lane.) It is suspected that the backing accident problem is significantly worse than the record system depicts, since slow-speed accidents (minor property damage) often go unreported." (66) Angle parking is considered 170% more hazardous than parallel parking. (68)

Diagonal parking has also been cited as a contributing factor in accidents on Sacramento Street in the downtown area. In the same area, there have been instances where parking cars have jumped the curb, crossed the sidewalk and run into buildings. In some cases the parking meter poles have stopped runaway vehicles.

Cherokee Lane has also been identified as an apparent accident generator, where there is excessive access to and from business establishments, with parking on sidewalks in front of some businesses. the extensive strip development without adequate off-street parking facilities is a contributing factor. (66)

It is not possible to completely eliminate traffic-related accidents. However, many can be, and are, prevented through enforcement of regulations, driver education programs and thoughtful traffic engineering.

During the course of street work, road crews and the general public are protected through implementation of work site protection steps as set forth in the City Public Works Safety Manual. (88)

WATERWAY HAZARDS

During the last seven years there has been only one boating-related fatality on the Mokelumne River north of the City despite the narrow, twisting channel and the snag-filled banks which are so hazardous to boaters and waterskiiers. According to the San Joaquin County Sheriff's Department, there have been surprisingly few boating accidents on the River compared to the degree of hazard and the number of accidents and fatalities that occur each year in the wider, less hazardous Delta channels. (65) The problem of motoboating on Lodi Lake and the River is discussed in the Mokelumne River Report prepared by the Lodi Community Development Department. (8)

The report recommends adoption of an ordinance limiting the size of the motor and/or speed of the boat on the river and in the lake. The lake is under the jurisdiction of the City, which also maintains the boat ramp that provides such access to the River; however, the river is in the County, necessitating action on the part of the County Board of Supervisors. At the present time the Sheriff's Department, which does have a limited boat patrol in the area, is able to enforce only the Harbors and Navigation Code limiting the speed to five miles per hour within 100 feet of swimming areas and small craft, or within 200 feet of a legal dock or swimming platform. Although a specific ordinance would facilitate enforcement, manpower to do so is limited at the County and City levels.

A small ramp owned and maintained by the Willow Glen Homeowners Association, as well as similar facilities in the Woodbridge area, and various beach areas along the river, also provide boat access to the water.

Over the last several years there have been a number of accidental drownings in the river and irrigation canals around the City. Nearly all of these accidents are the result of carelessness. Public swimming in a waterway is a permitted and supervised activity only at Lodi Lake; however, on hot days any body of water is an attraction, particularly to young people, and there are few public swimming areas in and around the City.

UTILITY HAZARDS

Local Utility Lines

The effects of flooding, fire, etc. on the City's utility network is discussed in those chapters. The City utilities, Pacific Gas and Electric (the natural gas and bulk electricity supplier serving Lodi, Lodi Cable TV and Pacific Telephone Company have programs for restoration of service in case of emergency and for operation of these utilities during time of disaster.

At the present time, utility lines themselves do not present a safety hazard to the residents of the City of Lodi, particularly in those areas where the lines have been undergrounded. However, this situation could be altered with inadequate maintenance or installation of the lines, etc. or interference by people, mechanical equipment, or even the weather, trees and shrubs.

Although more aesthetically pleasing and less susceptible to the above kinds of problems, undergrounded lines generally cost more and they too can be damaged during construction and road work. Pacific Gas and Electric (PG&E), Pacific Telephone and other companies with underground utilities participate in the USA, or Underground Service Alert Program. Prior to excavating, anyone can call (800) 642-2444 for information on the location of underground utilities which may belong to any of the participating agencies. If necessary, USA will dispatch the appropriate company representatives who will exactly locate any questionable lines. Prior to any excavation within the City, excavators should contact the City Utility Department and the Public Works Department. The City does not participate in the USA program; however, maps are maintained for public perusal that locate sewer, water, drainage lines and electrical utility easements. The legalities of the easements vary; however, in general they must be maintained free of structures or other uses which can interfere with maintenance of the utility lines. Designation of utility easements or alignments is an important part of the subdivision and development plan review process.

Major Transmission Lines

In addition to the local utility lines, there are major transmission lines which run through the City, including a 10 inch product petroleum line owned by Southern Pacific Pipeline, Inc., a major natural gas pipelines, and 60 kv electrical transmission lines. An increasingly significant safety consideration relative to major utility transmission lines is the possibility of sabotage and vandalism. As a result, companies are unwilling to map alignments, even for the express use of governmental agencies, and quite frequently a property owner or neighboring owner, may not know the exact location of an underground line, or in some cases, may not even be aware of its existence. Damage to major transmission lines not only results in the disruption of service to customers in the City, and possibly in areas as far away as Stockton, Sacramento, the Bay Area or beyond, but can also present serious safety

hazards within the City. Distribution and review of subdivision maps and development plans prevents potentially serious conflicts; however, all individuals involved must be acutely aware of the relationship between the project and the information which they may be requested to provide.

Natural Gas Fields

At the present time, there are no known natural gas field directly beneath the City of Lodi; however, there are existing and abandoned fields within a 10-mile radius of the City. Within the last 3 years, a newly discovered field in the area of Eight-Mile and Davis Roads, south of the City, was put into production. It is not impossible that there may be a point in the future when it might be necessary to drill for natural gas within or very near the City. The primary hazard is the possibility of a blow-out, and those hazards associated with a temporary increase in truck traffic and construction-type activities.

ENVIRONMENTAL POLLUTION HAZARDS

Those hazards most likely to have a serious adverse affect on the safety and well-being of the residents of the City of Lodi have been discussed above and in preceding chapters. Although not as immediate as the hazards and safety considerations already discussed, there are potential pollution hazards which at least deserve mention. These are primarily the possibility of increased noise, air and water pollution as a result of natural or man-caused disasters, or ongoing land-use changes.

Noise Hazards

In 1979, a citizen's task force, appointed by the City Planning Commission, concluded that noise pollution is not a significant problem in the City of Lodi at this time. However, the hazards of high noise levels were acknowledged and a number of recommendations for decreasing and monitoring existing noise levels were subsequently adopted by the City Council in lieu of a noise ordinance. The Noise Element of the General Plan, adopted in January, 1979, also sets forth specific policies for the prevention and mitigation of noise problems.

Air Pollution

Ongoing and increased air pollution is a serious health consideration throughout the Central Valley, as well as most of the State of California and major portions of the United States. In an effort to meet the State and Federal requirements (which San Joaquin County cannot do at this time) the County and Cities have adopted an Air Quality Maintenance Plan. As stated in the Plan, and alluded to in various sections of this Element, there are a number of

factors which contribute to deteriorating air quality which can be mitigated at the City level if they are considered during the project approval process.

Water Quality

Water pollution in this area is generally controlled by the Regional Water Quality Control Board, as is the case throughout California. The City is primarily concerned with the quality of the effluent from the White Slough Water Pollution Control Facility; the quality of the domestic and industrial water supply which come entirely from underground sources; and the water quality of the Mokelumne River and Lodi Lake.

Effluent from the City's White Slough Water Pollution Control Facility is discharged to grazing land during most of the year, with discharges to White Slough in the Delta only about 3 months in the winter. The ultimate goal is zero discharge to White Slough. In the case of a facility malfunction, wastewater and effluent can be contained in ponds on-site for short periods of time.

The City of Lodi's water system is continually monitored and controlled at Henning Substation. Since all supplies currently come from underground sources, the City's water quality is good; however, when necessary City supplies can be chlorinated. Chemical pollutants such as DBCP have been found. The affected wells are used on a limited basis. The extent and impact of this problem is now being considered by local, State and Federal officials and appears to be increasingly wide spread. The water tower on Main Street (discussed in Chapter 3) is the City's only storage facility outside of the inground distribution system. As underground water supplies become increasingly depleted, it may be necessary for the City to turn to surface supplies, and a water treatment facility. The City does have certain rights to the Mokelumne River, which also supplies the East Bay area.

The Mokelumne River is not considered a polluted stream; however, significant deposits of heavy metals flowing from the Penn Mine above Camanche Lake were cited as the cause of fish kills at the Mokelumne River Hatchery. Although the source of the pollution has been clearly identified and actions have been taken to alleviate the problem, it is not known what concentrations of zinc and copper may be in the bottom sediments in the River, where it passes through Lodi, or in Lodi Lake.

The beach at Lodi Lake, and private beaches along the River, are popular for swimming; however, the San Joaquin Local Health District could stop swimming if the coliform counts rise above a minimum level. Human and animal wastes (including that from waterflow, and cattle grazing upstream), and certain types of organic industrial wastes are the source of most coliform bacteria.

OTHER RELATED CONSIDERATIONS

In addition to those safety considerations directly related to land use planning, there are numerous other considerations which are indirectly related, but which could have a profound effect on individuals in the City of Lodi, and subsequently, perhaps, on the entire City. In some cases, there is action that the City can take to alleviate, minimize or make it easier to cope with certain situations, and, in other cases responsibility for direct, or indirect, action is beyond the scope of City policy. Among these very real, but often nebulous considerations is: the need for counseling or other support services for those residents suffering psychological trauma as a result of disaster or tragedy; retirement programs; ongoing education and training of City personnel and private citizens, particularly in hazardous or distressing occupations; programs and actions to cultivate employee and community morale; and support or facilitation of specialized programs which encourage mental and physical health and well-being.

CHAPTER 7

EMERGENCY PREPAREDNESS

The Policies and Implementation of this Chapter are Based on the Following

ASSUMPTIONS

The City of Lodi assumes that:

- All emergencies will not be prevented;
- As the City grows, there will be an increase in "short-term emergencies" and increased need for emergency preparedness;
- The majority of Lodi's population will continue to feel that emergency preparedness is almost entirely a government responsibility;
- Disasters within, or near, the City of Lodi are always a possibility.

The City of Lodi adopts the following

POLICIES

- The City will continue to identify and recognize potentially hazardous situations and determine acceptable levels of risk and emergency preparedness;

- The City will encourage and facilitate the paramedic program in Lodi, and the north County area;

- The City supports the concept of the 911 Emergency Telephone Plan and will cooperate with efforts to implement the Plan if it is to be funded through the State;

- Implementation of the 911 system will be considered in future improvements of the communication centers in the public safety building;

- The City will be prepared to handle "long-term emergencies";

- The intensity of land uses in commercial and industrial areas will be maintained consistent with the General Plan land use designations, City zoning, and the planned utility network.

- Utilities and other facets of the City's infrastructure will be sized on the basis of the maximum intensity of planned land use;

- Water lines in new industrial areas will be sized on the basis of the maximum fire loading possible in existing or proposed structures, in each industrial district, regardless of the existing or planned uses of individual structures;

- The City will develop policies and criteria for use in making priority decisions during emergency situations;

- The City will continue to support prevention and safety programs, and encourage educational programs which will make people aware of possible hazards, and emergency preparedness measures;

- The efficiency and effectiveness of the police, fire and utility departments will be maintained as the city grows;

- All City departments whose functions would be directly affected by nondisaster emergency situations of all types, will periodically review and update all emergency action and contingency plans, and where necessary make changes in equipment, operations or procedures.

- The City will participate in emergency planning at all levels.

- The City will participate with the County and other cities in the preparation, review, updating and implementation of Emergency Preparedness Plans.

- The City will obtain, evaluate, and if necessary, coordinate the emergency programs of all utility providers, medical providers, industries, businesses, and other agencies, including schools, within the City, that may have an effect on the City's capability to function adequately in time of emergency.

Based on the adopted policies, the City of Lodi will pursue the following

IMPLEMENTATION MEASURES

- The City will participate in emergency preparedness drills.

- The City Emergency Plan will be regularly updated and public informational brochures will be prepared.

- The City will evaluate all key emergency facilities as to their hazard susceptibility and incorporate this information into the City and County Emergency Plans.

- The City will sponsor CPR, first aid and other appropriate safety and emergency relief classes for all City employees and cooperate with the Lodi District Safety Council in encouraging industry, business and other agencies to implement such programs.

- The City will inventory and evaluate private and public "assets" that may be required to play a major role in an emergency or disaster.

- The City will inventory, evaluate, and take action with regard to nuclear attack and fallout shelters.

Chapter 7

A DISCUSSION ON

EMERGENCY PREPAREDNESS[1]

Prevention is the most economical, cost effective, and least stressful way to save lives and preserve property. Building on stable, flood-free soils; proper storage of hazardous materials; radar to detect speeding vehicles; fire prevention and prefire inspections; railroad crossing controls; bicycle lanes; patrol of swimming areas; airport clear zones; and safety education classes are all preventive measures that do save lives and preserve property; however, safety is also planning and preparing for emergency situations. The local community must anticipate possible needs and be able to respond to all emergencies to the fullest extent of its resources (1).

Identification, preventive action and then planning and coordination are the key elements of emergency preparedness in all situations.

The local community must identify and recognize potentially hazardous situations that cannot be prevented and determine what level of risk and emergency preparedness is acceptable. Local capabilities in the areas of facilities, equipment, and trained manpower must also be identified before alternative courses of action can be plotted. All sectors of the community should be involved in planning how to best meet the objectives of emergency preparedness--the saving of lives, preservation of property, and, of equal importance, the continued functioning of the social and physical system in which we live. Local capabilities and resources must then be coordinated to achieve the most efficient and effective emergency response, with the objective of handling and containing the situation without causing additional problems(1).

Four broad levels of emergency planning and preparedness are discussed as follows: 1) short-term emergencies; 2)long-term emergencies; 3) disasters; and 4) decisions and actions of the government or private sector that can hamper or facilitate emergency response(1). It is important to realize that any kind of an emergency has the potential of becoming a tragedy and possibly a disaster.

SHORT-TERM EMERGENCIES

"Short-term emergencies" happen with little or no warning and are generally confined to a single point or area, for instance, sudden acute injury or illness, a house fire, or auto accident. Some emergencies can be taken care of by those involved, however, most require the aid of trained professionals, such as repair persons, emergency medical technicians,

[1] The bulk of this discussion is an excerpt from the San Joaquin County Safety/Seismic Safety Element, prepared by the County Planning Department, 1978.

paramedics, doctors, nurses, firemen, and policemen who are prepared to handle "short-term" emergency situations as part of their daily jobs, and to mobilize as part of a bigger organization in case of disaster.

Short-term emergencies differ from disasters and long-term emergencies basically in intensity and degree of mobilization; however, they all require private and public commitment of resources, expenditures and human risk (1).

Emergency Medical Service

Emergency medical services in San Joaquin County, and neighboring valley and mountain counties, are now being inventoried and evaluated by the County Emergency Medical Care Committee and the North San Joaquin Valley Health Systems Agency. The draft of the 1978-1983 Health Systems Plan (2) recommends that the County Committee, in addition to the progress already made, review and implement a series of action programs, including establishment of a County Emergency Medical Services management agency, centralized medical emergency dispatch services; district service areas for each hospital emergency department to avoid overlap and duplication of services; a management and medical information system; a process for the selection of primary emergency departments; County emergency review panels for providing system-wide patient care reviews; and improved communication and coordination between hospitals, County Emergency Medical Communities, emergency medical care personnel, County Health Departments, and public safety agencies both within the County and between member counties.

The Plan also notes that use of emergency medical facilities in San Joaquin Valley cities is higher than other areas. This is attributed to the high number of travelers on major freeways and roads; the high number of seasonal employees; the number of illegal aliens involved in auto accidents; and dense tule fogs (21). There is an existing system of emergency medical care in the County, and local hospitals have prepared plans for external and internal emergency situations.

Seven hospitals in San Joaquin County offer emergency medical services as shown on Exhibit 44, including Lodi Memorial and Lodi Community Hospitals.

All of the City's firemen are trained in first aid, CPR and review techniques, and some are trained paramedics or Emergency Medical Technicians, (EMT's).

Individual emergency first aid and rescue efforts are considered an important supplement to the professional emergency medical services organization in Lodi. It is the goal of the local Heart Association Chapter, and the Lodi Fire Department, in cooperation with Fidelity

Savings and the Lodi District Safety Council,[1] to train one of every four City residents (including all high school students) in the use of cardiopulmonary resuscitation (CPR), rescue breathing and relief of choking techniques. All persons are also encouraged to take first aid classes which are regularly offered by various organizations.

Ambulance and Paramedic Service

Ambulance service is available throughout Lodi, and to all areas of San Joaquin County served by roads. In 1978, there were seven private and four nonprofit ambulance companies operating 29 ambulance vehicles in the nine San Joaquin County ambulance zones. Lodi Ambulance serves not only the City, but also all of the County area north of Eight Mile Road as shown on Exhibit 45. Average response time within the City is 3.6 minutes, and 9 minutes in the rural areas. Individual response times have improved considerably since the main station was relocated to Stockton Street south of Kettleman, where there is immediate access to the railroad underpass and major arterials (28).

Ambulance attendants determine to which facility a patient will be taken; however, patient preference is observed in most cases. For those emergency cases in which the patient does not express a preference, or in which the attendant feels the specified hospital is inappropriate, State law requires that the patient be taken to the closest facility with emergency capabilities.

State law requires that all ambulance attendants have minimum training as an EMT-1 (Emergency Medical Technical-1). EMT-1's must be prepared to appraise the condition of the victim, assess the effectiveness of whatever care was provided prior to their arrival, and then continue to maintain the victim by means of life support measures until care is assumed by licensed health professionals.

Paramedics are certified life support personnel, trained and authorized to inject drugs and intravenous fluids, heart defibrillation and electrocardiogram monitoring, in addition to basic and specialized emergency medical skills (1).

At this time, Lodi is one of the many areas in San Joaquin County which has paramedic service. Lodi has ten paramedics and a Mobile Intensive Care nurse. Currently, Tracy, Ripon and Stockton have paramedics. In the Stockton area paramedic service is provided in the incorporated city and Lincoln Fire Protection District by the Stockton Fire Department, and in the rural area by the A-1 and All-City Ambulance Companies. Tracy and Ripon provide paramedic service by ambulance, although Ripon is provided by the Fire Department. It is expected that the entire county, with the exception of the Linden area, will have paramedic service by 1981.

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[1]The goal of the Lodi District Safety Council is to inform, educate and advise Lodi area residents, businesses and the community organizations on matters pertaining to the safety of the community. Major projects are the Crossing Guard and Safety Patrol programs, Home Safety Award Program, Bi-monthly safety programs, and safety training programs (29).

Exhibit 44

EMERGENCY MEDICAL SERVICES - SAN JOAQUIN COUNTY

INVENTORY OF EMERGENCY MEDICAL SERVICES AND SELECTED SERVICES				Type of Service		Physician Staffing				Facilities & Services				Emergency Communication Capabilities								
NAME OF FACILITY	CITY	TYPE OF OWNERSHIP	ACUTE BED CAPACITY	EMERGENCY SERVICE OFFERED	SEPARATE ROOM PROVIDED	PHYSICIAN STAFFING	IN-HOUSE 24 HOUR	ON CALL 24 HOUR	ANESTH. IN 24 HOUR OR ON CALL	PSYCHIATRIC EMERGENCY	INTENSIVE CARE UNIT	CARDIAC CARE UNIT	BLOOD BANK	2 WAY RADIO WITH OTHER HOSP	2 WAY RADIO WITH CHIEF OF E.R.	2 WAY RADIO WITH PHYSICIAN	2 WAY RADIO WITH AMBULANCE	2 WAY RADIO WITH AMBULANCE COMP. BASE	2 WAY RADIO WITH CENTRAL DISPATCH	2 WAY RADIO WITH LAW ENFORCE.	2 WAY RADIO WITH FIRE DEPT.	ADVANCE RADIO COMMUNICATION REGARDING PRIOR CARE GIVEN
(1)* Lodi Community Hosp.	Lodi	PROP	93	Y	Y	1	Y		Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
(2) Lodi Memorial Hosp.	Lodi	NPA	99	Y	Y	1	Y		Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
(3) San Joaquin General Hospital	French Camp	CO	260	Y	Y	1	Y		Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y
(4) Manteca Hospital	Manteca	PROP	49	Y	Y	1	N	Y	Y	Y	N	Y	N	Y	Na	Na	Y	Na	Na	Na	Na	N
(5) Tracy Community Hospital	Tracy	NPA	59	Y	Y	1	N	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	N	Y
(6) Dameron Hospital	Stockton	NPA	148	Y	Y	1	Y		Y	Y	Y	Y	N	Nr	Nr	Nr	Nr	Nr	Nr	Nr	N	Y
(7) St. Joseph's Hosp.	Stockton	NPA	300	Y	Y	1	Y		Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N
(8) Oak Park Community Hospital	Stockton	PROP	43	N																		

KEY: Physician Staffing
1 - Full-time emergency staff physicians
* - Refers to map location

PROP - Proprietary
CO - County
NPA - Non-Profit Association

Y - Yes
N - No
Nr - Reported
Na - Not Available

prepared by san joaquin county planning department

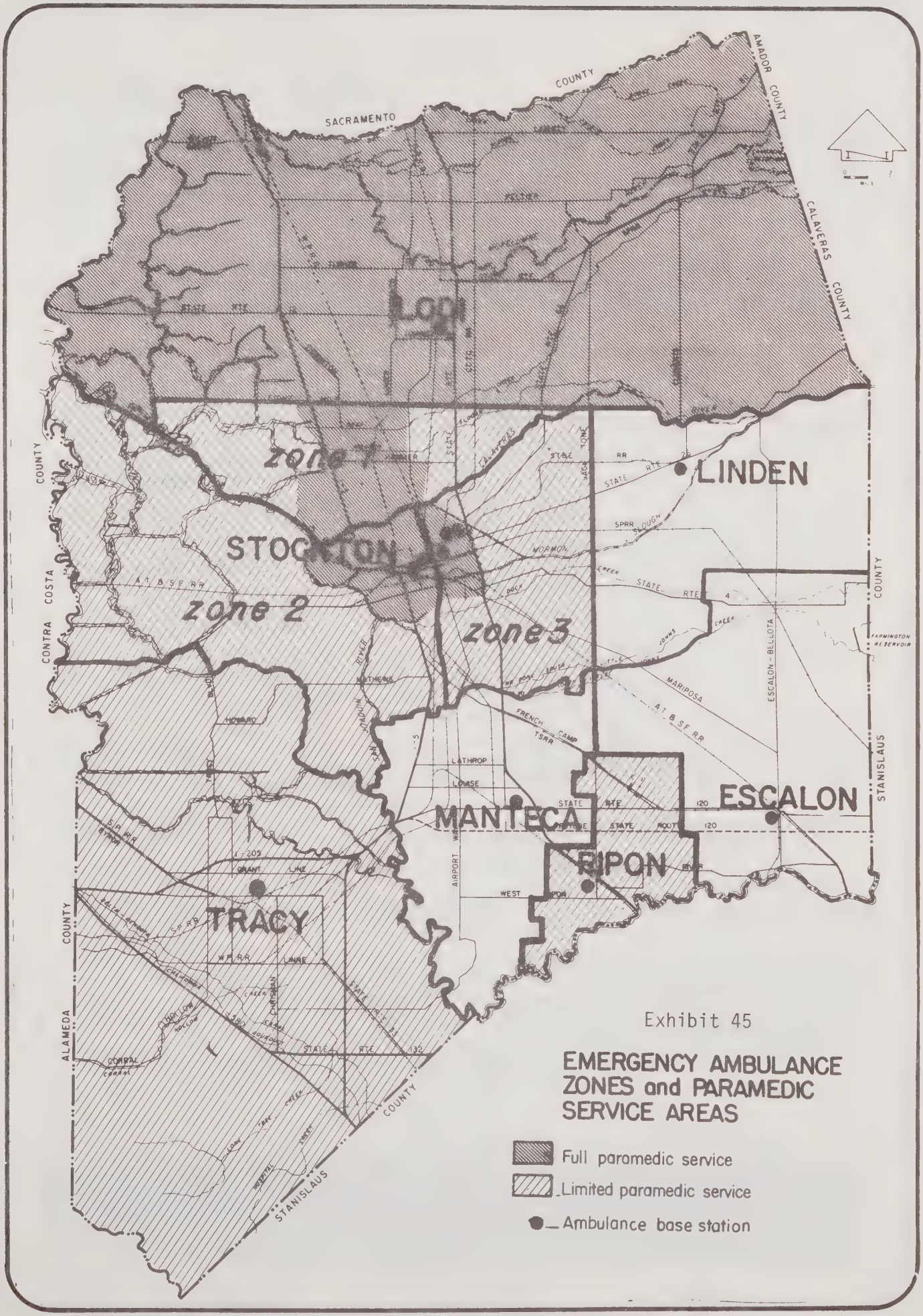

Exhibit 45

EMERGENCY AMBULANCE ZONES and PARAMEDIC SERVICE AREAS

Full paramedic service

Limited paramedic service

Ambulance base station

San Joaquin County Hospital is the primary base hospital for paramedic communication, with St. Joseph and Dameron Hospitals in Stockton as secondary communication hospitals. These hospitals have trained doctors and nurses to communicate with field paramedics on a twenty-four hour basis. All other hospitals are participating hospitals and do not communicate with the field paramedics, but do receive patients from the field. (93)

During a declared local or regional disaster, ambulance and paramedic squads will function according to the City or County Emergency Plan, presumably under the direction of the City and/or County Offices of Emergency Services.

Radio Communication

On a daily basis and in time of disaster, radio communication systems are one of the most important aspects of emergency preparedness. The four emergency-related networks in use in San Joaquin County at the present time are summarized in Exhibit 46. A framework for integrated use and operation of these networks during a disaster is being developed by the County Office of Emergency Services.

Exhibit 46

SAN JOAQUIN COUNTY RADIO NETWORKS

Emergency Medical Network	Fire Network	Law Network	Local Gov't Network
VHF	VHF	VHF	UHF
11 Ambulance Companies (incl. portable short-range radios used in the field) 7 Hospital emergency rooms Stockton Police Department Stockton Fire Department St. Joseph's & County hospitals have radio link with regional hospitals	22 Fire districts 4 City Fire Dept. Airport crash and rescue County Fire Warden Sheriff Office Emergency Services	Sheriff City Police Depts. (except Stockton) County Jails Honor Farm CHP OES	Public Works Department Parks & Recreation Animal Control Agriculture Department Weights/Measures Building Inspection Motor Pool Sheriff Board of Supervisors Office of Emergency Services
regularly used by ambulance companies to communicate with hospitals	limited daily use	limited daily use	limited daily use

Exhibit 47

In case of any type of emergency in San Joaquin County, citizens can obtain local information by tuning their radios to

KJOY, 1280 Khz on the dial

911 Telephone System

The 911 Emergency Telephone Legislation, originally signed into law in 1972, requires all cities, counties, and emergency service districts in California to prepare and establish 911 emergency telephone systems by 1982. Deadlines for implementation have been extended to 1985. 911 is a single three-digit emergency telephone number to be used statewide. The system is intended to shorten the time between the detection of an event and the dispatch of assistance. If, and when fully implemented, more than 60 seven-digit numbers will be replaced in San Joaquin County. The Lodi answering point will refer calls to 28 fire, police and medical agencies.

911 emergency calls will go to trained Public Safety Answering Point operators, who will either dispatch help directly or relay the call to the appropriate public safety agency. There will be 911 emergency answering points in Stockton, Lodi, Tracy and Manteca, located in the City Police Departments. Tracy has successfully established their 911 system and the three remaining cities including Lodi will comply with future State Guidelines.

The 911 system is to be funded principally from State subventions to the City, which are derived from a 1/2% surcharge now being collected on phone service. However, as a result of revised estimates to implement the system, including additional personnel and revamping the police communications center, the City has approved the final plan subject to the condition that corrective legislation be enacted by the State Legislature to either provide full funding of all 911 system costs (including implementation and maintenance) or to delete the required implementation of the system (27).

The 911 system would be very beneficial to people living, working or traveling in the unincorporated areas. Very often these people call the City emergency numbers which results in critical time delays. The system would also be beneficial to City residents by cutting down on the time between the detection of trouble and the dispatch of the proper assistance.

Non-Medical Emergencies

In addition to short-term emergencies like a house fire or auto accident, the community must be prepared to react and function when there are other types of emergencies such as power blackouts or brownouts, gas or water line breaks, sewer system failure, sudden need to dispose of large quantities of waste that might normally be processed or taken out of the area for disposal, source contamination of water supplies, inadequate sanitary facilities where there are crowds of people, or road blockages, to name a few (1).

All of these situations require the mobilization of human and physical resources, and are related to land use. Although it is each person's responsibility to prepare for these kinds of emergencies to some degree, actual responsibility for program organization and subsequent action rests primarily with City and County government (1).

At the present time, overall City and County emergency plans do not specifically address these kinds of emergencies; however, individual departments and responsible agencies do have procedures to handle some of the situations. For instance, the City Utility Department has emergency plans for maintaining and/or restoring power on an area-by-area basis. Those areas with critical facilities would probably be given preference. The City has contingency plans for those emergencies which would adversely affect the water and sewage disposal treatment systems. However, all of these systems would be inoperable if Pacific Gas and Electric supply facilities are not functioning.

Police and Fire Department procedures are designed to provide, at the minimum, guidance in a variety of situations, and personnel are trained to make on-the-spot assessments and procedural decisions depending upon circumstances. Fire and crime hazards are discussed in Chapters 4 and 5.

LONG - TERM EMERGENCIES

"Long-term" emergencies are not everyday occurrences, and generally happen over a period of time. However, they often spawn short-term types of emergencies, and, like many short-term emergencies, have the potential for becoming disasters. These kinds of emergencies include drought, heat-waves, epidemics, pestilence, long periods of fog, labor strikes, gasoline and energy shortages, cold snaps, economic depression, transportation shut-downs, and animal or plant diseases(which can be of grave concern in an agricultural area).

Long-term emergencies generally affect a large region; therefore, governmental action is necessary to coordinate relief efforts. In addition to the role of coordinator and response agent, the local government must be programmed to recognize these kinds of emergencies in time to develop specific actions to mitigate the problem and possibly avert disaster (1).

NUCLEAR WAR

Since the early 1960's, concern about nuclear war preparedness has been left almost entirely to State and County Emergency Offices, with little participation at the local level, primarily as a result of a prevalent attitude of public indifference.

Exhibit 48lists public fallout shelters in Lodi which have been inspected and so designated by the U. S. Army Corps of Engineers. The shelters are intended to provide protection against lethal levels of outside radiation, and will be stocked and staffed for occupancy when a state of National Readiness is declared. At present, there is no formal system for designation of additional shelter space as buildings in the City are constructed or remodeled.

The alternative to public shelters is construction and maintenance of at-home shelters. Although these shelters might possibly be a "lifesaver" in case of nuclear attack, if not adequately maintained, they can also be a serious safety hazard the rest of the time. Food and water supplies should be replaced regularly and the shelter periodically cleaned and checked for structural stability. If the shelter is to be abandoned, particularly in the case of underground shelters, the space should be filled in or appropriately sealed. Successive property owners or users should be aware of the shelter's location and status.

Exhibit 48

FALLOUT SHELTERS IN LODI

Facility	Address	Total Occupancy
Lodi Academy, Admin. Bldg.	1230 S. Central Avenue	125
Aro Antiques	16 N. Cherokee Lane	120
Richmaid Ice Cream Company	100 S. Cherokee Lane	120
Pacific Telephone and Telegraph, Lodi Exhange	124 W. Elm Street	835
Lodi Memorial Hospital	975 S. Fairmont Avenue	4,100
(Old) Tokay High School	125 S. Hutchins Street	2,380
Lodi High School, West Campus	3 S. Pacific Avenue	210
Farmers and Merchants Bank	121 W. Pine Street	1,095
Imperial Hotel	47 S. Sacramento Street	545
Tokay Olds-Buick-Opel, Inc.	216 S. Sacramento Street	100
Bank of America	31 S. School Street	61
Farmers and Merchants Bank	102 N. School Street	778
U. S. Post Office	120 S. School Street	365
Pacific Telephone and Telegraph, Relay Buidling	110 W. Turner Road	3,370
General Mills Grain Elevator	2000 W. Turner Road	1,720
American Legion Hall	320 N. Washington Street	505
Duncan Press Warehouse	600 W. York Street	165

DISASTER PLANNING

Disaster planning and relief involves not only emergency professionals but other sectors of the community as well, depending upon the disaster.

The key to effective disaster preparedness and action is a workable plan, practice, and more planning, which especially involves those people who will probably be the first to respond.

A very important aspect of disaster preparedness is training personnel to evaluate emergency situations and to recognize those situations which are potential or real disasters so the emergency organization set up in the City and County Emergency Plans can be mobilized as early as possible when it can be most effective (1).

EMERGENCY PLANS

The City and County Emergency Plans are comprehensive disaster preparedness programs, concerned not only with a war threat, but primarily with the threat of disaster as a result of natural and/or man-made hazards and factors. The County Emergency Plan adopted in 1975 and revised biannually per State law, says, "The County of San Joaquin (which includes local jurisdictions) will respond to the following types of emergency situations:

earthquake
tsunami - mutual aid response only[1]
flood
fire
accident (transportation, industrial, radiological incident)
civil disturbance (riot)
storm
pollution
epidemic

The City of Lodi Emergency Plan was adopted in November, 1973 and is based largely on the San Joaquin County Emergency Plan. The Lodi Plan, at the present time, is less comprehensive than the County Plan, which includes designation of local jurisdictional responsibilities in the specific annexes, i.e. fire, law enforcement, procurement, public information, situation intelligence, medical services, etc.

The County Plan states, "Civil government, augmented and reinforced during an emergency, conducts emergency operations, provides or utilizes mutual aid, and controls critical and essential resources. Civil government also provides support to military forces engaged in retaliatory or defensive operations (22).

The purpose of the basic Emergency Plan and the more detailed divisional plans, called annexes, is to:

"1. Provide a basis for the conduct and coordination of emergency operations and the effective management of critical resources during emergencies.
2. Establish a mutual understanding of the authority, responsibilities, functions and operations of civil government during emergencies.
3. Provide a basis for incorporating into the County emergency organization non-governmental agencies and organizations having resources necessary to meet foreseeable emergency requirements" (22).

The Plan "identifies foreseeable organizational requirements, tasks, resource requirements, and basic procedures for the conduct of emergency operations. Non-essential governmental and private activities may be reduced or stopped, depending upon emergency conditions" (22).

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[1]Tidal waves are not a hazard in San Joaquin County.

The City and County Plans were adopted with the following Assumptions and Objectives:

"1. The responsibility for emergency preparedness rests with civil government at all levels.

2. Adequate pre-emergency testing of facilities and equipment will ensure reliable functioning.

3. Available warning time, used effectively, will decrease potential life and property loss.

4. The nature and extent of an emergency will govern which elements of the emergency organization will mobilize and respond" (22).

The City and County Emergency Organizations will plan, prepare for and conduct emergency operations in order to accomplish the following objectives:

"1. Save lives and property
2. Repair and restore essential systems and services
3. Provide for the protection, use and distribution of remaining resources
4. Provide a basis for direction and control of emergency operations
5. Provide for the continuity of government
6. Coordinate operations with the emergency service organizations of other jurisdictions."

The City Emergency Plan goes into effect:

"1. Automatically by the existence of a State of war emergency
2. When the Governor has proclaimed a state of emergency
3. On the order of the Mayor or Director of Emergency Services (City Manager), provided the existence of a local emergency has been proclaimed in accordance with the Emergency Services Ordinance of the City" (23).

"In addition, the Director of Emergency Services is authorized to order the mobilization of the City Emergency organization or any portion of the organization in order to provide for increased readiness in the event of the threatened existence of an emergency prior to the full implementation of the Plan" (23). The primary responsibility of the Director of Emergency Services is to control and direct the efforts of the Emergency Organization which is composed primarily of City Departments organized into functional divisions. This comprises the City Disaster Council.

Multiple disasters are a possibility in Lodi and San Joaquin County. For instance, an earthquake could cause complete failure of utilities, communication systems and transportation networks throughout the City and County, at the same time causing a dam failure resulting in the threat of inundation. Levee breaks due to liquefaction in the Delta could compound the problem with inundation of additional area that would have otherwise been flood-free. The problems are obvious--where do people go, how do they get there and what are the priorities for relief (1).

The County Office of Emergency Services is preparing specific plans that will facilitate organization and relief efforts by focusing on the unique circumstances of a number of diverse probable events. A Dam Failure Plan, prepared in 1977, is discussed in the chapter on Flood Hazards, where inundation areas and evacuation routes are summarized. Other specific plans underway will cover seismic hazards (discussed in Chapter 3 , and evacuation plans in case of a nuclear accident at Rancho Seco (discussed in Chapter 6).

Proper planning and utilization of an emergency plan reduces reaction times and improves coordination, thereby saving lives and preserving property. The existence and maintenance of operable local emergency plans make it possible to use existing resources and capabilities and implementation of a local plan also prompts identification of potentially disastrous situations, and subsequent development of measures aimed at weakening the impact or alleviating the hazard.

Disaster preparedness and response is definitely related to land use and other aspects of community planning. Nearly all physical systems must become an asset to the relief effort, and if not properly planned prior to a disaster, they could become a liability or even a hazard, as discussed in the last section of this chapter (1).

DECISIONS AND ACTIONS AFFECTING EMERGENCY PREPAREDNESS

The final level of emergency preparedness is the responsibility of those who make decisions and take actions on programs or projects that can have a very important, but often unrecognized effect on emergency preparedness and response.

Design considerations such as driveway widths, building overhangs, road widths and turnarounds, parking facilities, door and window locations, site design, and street names and numbers, to name only a few examples, can hamper or facilitate the movement and use of equipment, and emergency response efforts (1).

City standards require that all new public roadways be a minimum of 50 feet in width. This results in a 36' curb-to-curb distance. Multi-family, commercial and industrial developments are reviewed by the Fire Chief, who, by City Ordinance is empowered to reject plans or to approve them with or without conditions. Site Plan and Architectural Review Committee projects are also closely scrutinized for safety considerations.

The relationship between the City's infrastructure and the location and type of land uses is a critical factor in emergency preparedness. Electrical lines, sewer lines, drainage systems, and water lines, particulary, can be critical during an emergency. Industries and commercial uses are best located where they can take advantage of existing systems or where

they can be assured of future services. High pressure water lines are necessary for fire fighting in commercial and industrial areas; therefore, water mains may have to be up to 14" in heavy industrial areas, particularly if structures are capable of housing hazardous high fire load contents such as paper products or flammable liquids. Industrial or commercial districts which permit uses that regularly use high volumes of water, such as canneries, should be served by over-sized mains in anticipation of lower water pressure along the line. The water lines (and other utilities as well) should be sized to serve the planned density of development. The water lines in the industrial areas are sized on the basis of the City of Lodi Water System Master Plan, which was adopted in 1977. That plan assumed that all future industry would be generally light industrial with a demand of 1,000 gallons per acre per day, which does not allow for heavy users. Six-inch to eight-inch water mains are considered sufficient for low-density residential areas. The water system and structural safety have a direct relationship to insurance costs (Chapter 4).

Disaster prevention and emergency preparedness are among the many items that the Planning Commission, City Council and Site Plan and Architectural Review Committee must consider in land use decisions, because all land use decisions do have varying degrees of impact on the emergency preparedness system. If a particular category of land use is to be developed in an area, there should be a commitment to establish a complete and appropriate level of infrastructure (utilities, drainage, streets, police and fire protection), for the protection of that land use and the public and private investment.

There is a cost to the public and a high risk of human life and property each time there is an emergency; however, these costs and risks can be alleviated or minimized if projects or activities of a potentially hazardous nature, or projects in potentially hazardous areas, are not encouraged or are approved with appropriate conditions.

The entire physical system of the City must become an asset, and not a liability in the event of any kind of emergency. In conflicting cases, decision makers must be prepared to make priority decisions based on policies.

The above are all considerations not only in preventing, speeding or slowing emergency response, but also in terms of the entire emergency preparedness organization. It is very important that as many components of the normal operating system of daily life in the City run as smoothly as possible during an emergency to provide support for that portion of the system affected by the emergency, and to help ensure that the system will function as normally as possible for the security of both those who are directly involved and those not involved at all (1).

APPENDICES

APPENDIX A

FLOODPLAIN ZONE

SEC. 27-12C. FP FLOODPLAIN DISTRICT

(a) Scope and Intent

1. This section is intended to establish specific restrictions on the use of those properties or portions of properties which are situated within the city and within the Mokelumne River floodplain and in the special flood hazard areas as defined in this section.

Special regulation is necessary for the protection of the public health, safety and general welfare, and of property and improvements both within and without the areas described above in this subsection from hazards and damage resulting from floodwaters and to promote the open space conservation element policies of the city's general plan.

(b) Floodplain Boundaries.

1. The Mokelumne River floodplain is defined as those areas of special flood hazard identified by the Federal Insurance Administration through a scientific and engineering report entitled "The Flood Insurance Study for the City of Lodi" dated April 1973 with accompanying flood insurance rate maps and any revision thereto which are hereby adopted by reference and declared to be a part of this section. Maps and data which reflect this delineation are on file in the office of the director of community development of the city.

(c) Definitions. Unless specifically defined below, words or phrases used in this section shall be interpreted so as to give them the meaning they have in common usage and to give this section its most reasonable application.

"Area of special flood hazard" is the land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year.

"Base flood" means the flood having a one percent chance of being equalled or exceeded in any given year.

"Development" means any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving or excavation.

"Flood" or "flooding" means a general and temporary condition of partial or complete inundation of normally dry land areas.

"Flood insurance rate map (FIRM)" means an official map of the city or San Joaquin County, on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

"Flood insurance study" is the official report provided by the Federal Insurance Administration. The report contains flood profiles, as well as the flood hazard boundary-floodway map and the water surface elevation of the base flood.

"Habitable floor" means any floor usable for living purposes which includes working, sleeping, eating, cooking or recreation, or a combination thereof. A floor used only for storage purposes is not a "habitable floor."

"Mean sea level" means the average height of the sea for all stages of the tide.

"New construction" means structures for which the start of construction commenced on or after the effective date of the ordinance codified in this section.

"Substantial improvement" means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds fifty percent of the market value of the structure either (1) before the improvement or repair is started; or (2) if the structure has been damaged and is being restored before the damage occurred. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include any project for improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions.

(d) Floodplain District (FP). All areas within the boundaries of the special flood hazard areas which are also within the city are rezoned to the FP (floodplain) zone.

(e) Prezoning of Flood Hazard Lands. All areas not within the city but within the boundaries of the special flood hazard area identified by the Federal Insurance Administration through a scientific and engineering report entitled "The Flood Insurance Study for the County of San Joaquin" dated March 1977 and which are also within the city planning area as shown on the Lodi general plan are prezoned to the FP (floodplain) zone.

(f) Establishment of Development Permit. No structure or land shall hereafter be located, extended, converted, or altered within FP (floodplain) zoned lands without full compliance with the terms of this section, and without having first received a development or construction permit in accordance with the provisions of this article; and for developments requiring use permits, with the provisions of section 27-15(c). Development permit applications shall be reviewed by the community development director and the requirements of this section enforced in accordance with section 27-22.

(g) Uses Permitted.

1. The following uses are permitted without a use permit where modification or removal of native vegetation, including trees, is not required.

(A) Agriculture.

(i) Open space agricultural uses not requiring a closed building such as cropland, orchards, and livestock feeding and grazing.

(ii) The storage of farm machinery which is readily removable from the area within the time available after flood warning;

(B) Recreational. Firmly anchored recreational floating docks;

(C) Modification of Native Vegetation. Where modification or removal of native vegetation is required, such modification or removal may be permitted after obtaining a development permit consisting of written approval from the community development director; provided, that such proposed modifications in the floodplain have been found to be consistent with the open space conservation element of the general plan.

2. The following uses may be permitted after approval of a conditional use permit by the city and after approval by the State Department of Fish and Game and the Reclamation Board of the state; provided, that as determined by said Reclamation Board, a combination of such uses within the floodplain does not materially increase the flood height of the intermediate regional floodplain; and provided, that as determined by the State Department of Fish and Game, that full mitigation measures will be used to protect and enhance the trees, native plant materials and wildlife in the floodplain, in accordance with good fish and game practices and in accordance with the general standards listed under subsection (h) of this section;

(A) Residential dwellings on existing undeveloped lots in subdivisions approved before January 1, 1977;

(B) Outdoor recreational facilities;

(i) Campgrounds,

(ii) Boating facilities,

(iii) Parks,

(iv) Golf course or driving range,

(v) Athletic fields,

(vi) Shooting range;

(C) Fences, fills, walls, excavations or other appurtenances which do not constitute an obstruction or debris-catching obstacle to the passage of floodwaters and which are consistent with the open-space conservation element policies;

(D) Private drives, bridges, and public utility wires and pipelines for transmission and distribution;

(E) Improvements in stream channel alignment, cross-section, and capacity including modification of riverbank and flood protection levee;

(F) Structures that are designed to have a minimum effect upon the flow of water and are firmly anchored to prevent the structure from flotation (excepting floating docks), provided no structures for human habitation shall be permitted;

(G) Other similar uses of a type not appreciably damaged by floodwaters,

(h) General Standards. In all areas of special flood hazard the following provisions are required:

1. The lowest floor of any residential structure, including garages and accessory buildings, shall be elevated eighteen inches or more above the level of the base flood elevation.

2. All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure.

3. All new construction or substantial improvements shall be constructed with materials and utility equipment resistant to flood damage using methods and practices that minimize flood damage.

4. New and replacement water and sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

5. New nonresidential structures shall be floodproofed or elevated eighteen inches or more above the level of the base flood.

6. The storage or processing of materials that are in time of flooding buoyant, flammable, explosive, or could be injurious to human, animal or plant life is prohibited.

7. All structures requiring floodproofing shall be so designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads with effects of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied and a copy of such certification shall be provided to the director of public works and the chief building inspector.

(i) Duties and Responsibilities of the Community Development Department. It shall be the duty of the community development department to:

1. Review all development permits to assure that the permit requirements of this section have been satisfied, and to insure that construction or development sites are reasonably safe from flooding;

2. Review permits for proposed development to assure that all necessary permits have been obtained from those federal, state or local governmental

3. Notify the county of San Joaquin and the State Clearing House prior to any actions approving alteration or relocation of the Mokelumne River and submit evidence of such notification to the Federal Insurance Administtion, in accordance with current state guidelines;

4. Verify and record the actual elevation (in relation to mean sea level) of the lowest floor of all new or substantially improved structures as well as the actual elevation to which they have been floodproofed;

5. All records pertaining to the provisions of this section shall be maintained in the office of the community development department and shall be open for public inspection.

(j) Warning and Disclaimer of Liability. The degree of flood protection required by this section is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by manmade or natural causes. This section does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This section shall not create liability on the part of the city or by any officer or employee thereof for any flood damages that result from reliance on this section or any administrative decision lawfully made hereunder. (Ord. No. 1138, sec 1.)

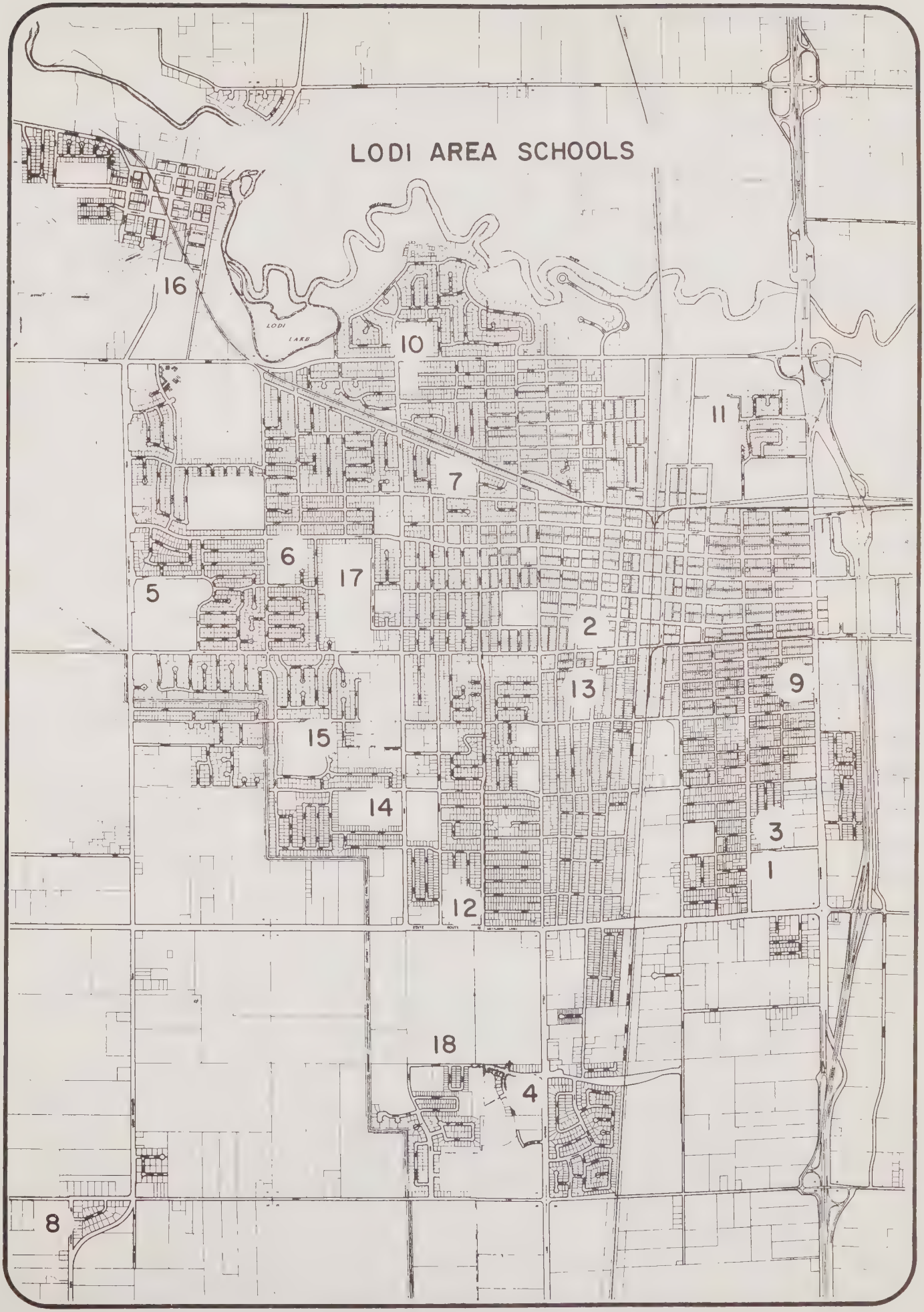
APPENDIX B

LODI AREA SCHOOLS

Map No.	School/Address
1	Lodi Academy * 1230 S. Central Avenue
2	Saint Anne's School* 200 S. Pleasant Ave
3	Seventh Day Adventist* 1001 S. Garfield
4	Century School* 550 W. Century Blvd.
5	St. Peter's Lutheran School* 2400 Oxford Way
6	Erma B. Reese 1800 W. Elm Street
7	George Washington 831 W. Lockeford Street
8	Henderson School 13451 N. Extension Road
9	Heritage School 509 E. Eden Street
10	Lakewood School 1100 N. Ham Lane
11	Lawrence School 300 Pioneer Drive
12	LeRoy Nichols School 1301 S. Crescent Avenue
13	Needham School 420 S. Pleasant

Map No.	School Address
11	Senior Elementary School 945 S. Ham Lane
15	Vinewood School 1600 W. Tokay
16	Woodbridge School 18500 N. Lilac Street
17	Lodi High School Oak and Pacific Streets
18	Tokay High School 1111 W. Century Blvd.

*Private Schools - All others are public


LODI AREA SCHOOLS
16
LODI LAKE
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APPENDIX C

GLOSSARY OF TERMS

ALLUVIAL FANS	Alluvial fans are sloping accumulations of soil and rock built by rivers flowing from mountains onto lowlands.
ALLUVIUM	A general term for the sediments carried by water and laid down in river beds, flood plains, lakes, fans at the foot of mountain slopes, and estuaries.
AMPLIFICATION	The increase in earthquake ground motion that may occur to the principle components of seismic waves as they enter and pass through different earth materials.
AVERAGE RESPONSE TIME	The average length of time between the point at which an emergency call is placed and the requested services (such as fire or police protection) arrives.
BEDROCK	Any solid rock underlying soil, sand, clay, etc.
BLOW-OUT	The uncontrolled ignition of a natural gas or petroleum well.
CFS	Cubic feet per second; measure of flow or volume.
COLIFORM BACTERIA	A species of bacteria in fecal matter used as an indicator of water quality.
CPR	Cardio Pulminary Resuscitation, a technique for emergency revival of the circulation and breathing cycles that can be performed by any trained individual
CRITICAL STRUCTURES	Those essential facilities necessary for the health, safety and general welfare of the population, particularly in the event of an emergency, such as an earthquake.
DBCP	Dibromochlorapropane; an agricultural pesticide formerly used widely throughout the Lodi area in the control of nematodes. Although now significant, levels are found in water supplies.

DISPLACEMENT	The dislocation of one side of a fault relative to the other side resulting from earth movement.
EARTHQUAKE	Perceptible trembling to violent shaking of the ground, produced by sudden displacememt of rock below and at the earth's surface.
EPICENTER	The geographic location of the point on the surface of the earth that is vertically above the earthquake focus.
FAILURE	Collapse or foundering of a structure, e.g., the failure of a dam or levee.
FAULTS	In earth fracture, or zone of fracture, along which the rocks on one side have been displaced in relation to those of the other. In active fault is one in which any of the following are apparent: 1. Evidence of geologically young fault movements. 2. Fault creep. 3. Surface rupture within or adjacent to the study area in historic time. An inactive fault shown no indication of any of the above criteria.
FAULT SURFACE	Surface along which dislocation has taken place.
FLOODPLAIN	A belt of low, flat ground bordering a strain channel on one or both sides which is flooded when the stream channel overflows.
FLOODWAY	An engineered area on either, or both sides of a stream channel designed to act as a floodplain; however, usually narrower than a natural floodplain and bound by levees to contain water of up to a 100 Year Flood.
FOCUS	The point within the earth which marks the origin of the elastic waves of an earthquake.
FOLD	A bend in rock strata.

FORMATION	A rock body or assemblage of rocks which have some character in common; a rock unit used in mapping.
FRACTURE	Breaks in rocks due to intense faulting or folding.
FREQUENCY	The number of seismic wave paks which pass through a point in the ground in a unit of time. Usually measured in cycles per second.
GATES OR FLAP GATES	A gate is a low-pressure valve-type device, used primarily to block drainage line; a flap gate is a hinged covering of a pipe which permits flow in one direction, but impedes flow in the opposite direction.
GEOLOGY	A science that deals with the history of the earth and its life, especially as recorded in rocks.
GROUND SHAKING	Motions of the surface rock or soil during an earthquake which may or may not result in breakage.
INUNDATION	Flooding.
LANDSLIDE	The perceptible downward sliding or falling of a relatively dry mass of earth, rock, or mixture of the two. Often also loosely used to include sliding of wet earth masses such as mudslides and earthflows.
LATERAL FORCE	A sideways or horizontal exertion of energy or motion.
LIQUEFACTION	A process by which saturated sand liquifies, causing surface structures to sink or float in a quicksand like material. This process is caused by shaking or vibration associated with earthquake activity.
LONG-TERM EMERGENCY	Those types of emergencies which are not frequent occurrences, but which generally happen over long periods of time. Long-term emergencies include situations such as drought, resource shortages, and other regionally affected crisis.
MAXIMUM DAILY CONSUMPTION RATE	The maximum amount of water needed to supply the demands of city residential, commerical and industrial users on a daily basis, excluding any large demand created by fire protection during emergencies.

MREM	Millirems; units of measure for radioactive particles.
SEDIMENT	Earth materials carried downstream in swift flowing waters and deposited in areas of slow currents, often resulting in sand bars on beaches.
SEICHE	The oscillation or sloshing of water in a lake, bay, or other enclosed body of water caused by seismic activity, or landsliding.
SEISMOGRAPH	An instrument which writes a permanent continuous record of earth vibration.
SHORT-TERM EMERGENCIES	Those emergencies which happen suddenly with little or no warning, and usually occur in localized or specific areas. House fires and auto accidents can be considered short-term emergencies.
STANDPIPE SYSTEM	A high vertical pipe or reservoir that is used to secure a uniform pressure in a water supply system.
STANDARD PROJECT FLOOD	The flood with a given magnitude or greater has a .2% probability of occurring in any year; equivalent to a 500 Year Flood, in the case of the Mokelumne River. A 100 Year Flood is a flood with a given magnitude (or greater) which has a 1% probability of occurring in a given year.
SUBSIDENCE	A sinking of a large area of land, usually observed as a shrinkage.
TERMINAL DRAINAGE WATERCOURSE	The point where a man-made drainage system empties water into a natural drainage channel. In Lodi, terminal drainage watercourses are the Woodbridge Irrigation District Canal and the Mokelumne River.
TSUNAMI	A sea wave produced by seismic activity on ocean floors. Also, known as seismic sea waves.
WATER TABLE	The upper surface of a zone of water suturation within the ground.

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BIBLIOGRAPHY

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ENVIRONMENTAL REVIEW

INITIAL STUDY

ASSESSMENT OF ENVIRONMENTAL IMPACTS

	WILL THE PROJECT HAVE A SIGNIFICANT EFFECT THROUGH ANY OF THE FOLLOWING IMPACTS?	Yes	Maybe	No
a.	Contaminate public water supplies	☐	☐	☒
b.	Conflict with existing, established, conforming land uses	☐	☒	☐
c.	Have a substantial, demonstrable, negative aesthetic effect	☐	☐	☒
d.	Substantially degrade surface or ground water quality	☐	☐	☒
e.	Substantially deplete surface or ground water resources	☐	☐	☒
f.	Substantially interfere with ground water flow or recharge	☐	☐	☒
g.	Conflict with adopted plans, goals or policies of San Joaquin County /or City of Lodi	☐	☒	☐
h.	Cause a significant effect related to flooding, erosion or siltation	☐	☐	☒
i.	Substantial alteration of natural topography, soil or subsoil features	☐	☐	☒
j.	Disrupt or divide the physical arrangement of an established community	☐	☐	☒
k.	Cause or allow substantial increase in consumption of natural resources	☐	☐	☒
l.	Induce substantial growth, concentration or displacement of population	☐	☐	☒
m.	Substantially increase the ambient noise or glare levels for adjoining areas	☐	☐	☒
n.	Substantially affect rare or endangered species of animal or plant or their habitat	☐	☐	☒
o.	Breach published national, state, or local standards relating to solid waste or litter control	☐	☐	☒
p.	Substantially interfere with the movement or habitat of any species of fish, wildlife or plant	☐	☐	☒
q.	Encourage activities which will result in the use of large amounts or waste of fuel or energy	☐	☐	☒
r.	Necessitate major extensions of sewer, water, electrical, gasoline or telephone lines or public roads	☐	☐	☒
s.	Except as part of a scientific study, disrupt or alter an archaeological, historic, or paleontological site	☐	☐	☒
t.	Increase exposure of individuals or property to geological, public health, traffic, flooding related, or other hazards	☐	☐	☒
u.	Violate any ambient air quality standard, substantially contribute to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentration	☐	☐	☒
v.	Substantially increase demand for, or utilization of existing public facilities or services such as schools, or fire or police protection	☐	☒	☐
w.	Substantially change transportation patterns related to existing traffic load, street capacity, parking availability, mode of travel or traffic safety	☐	☒	☐

EVALUATION OF PROJECT

Adverse impacts of project and their magnitude: Long-term implementation may require some change in established land use patterns and/or changes in future land use decisions, re: safety considerations. Policies in this Element may conflict with other City policies, forcing a consideration of priorities at the time project decisions are made. Increased public awarenessmay result in increased pressures on the City's Emergency Services.

Mitigation measures offered ~~by developers~~ to reduce adverse impacts: The entire focus of this Element is to improve the quality of life in the City of Lodi; aforementioned impacts may or may not be significant at the time specific projects are evaluated.

Compatibility of project with existing or proposed General Plan, zoning or land uses: See above

☒ Accept Negative Declaration on the following basis: ☐ Require Environmental Impact Report for following reasons:

There are no significant, adverse, environmental impacts as a direct result of the adoption of this Element. Indirect impacts, as discussed above, must be addressed at the time a specific project is evaluated. Unworkable portions of the Element should be deleted prior to adoption.

DETERMINATION OF IMPACT

Based on this initial study, and any supplemental information attached, any possible significant effects have been identified and are attached with mitigation measures. From this information, it has been determined that:

☐ This project is exempt.

☒ On the basis of this initial study, we find that the proposed project could not have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ Although the proposed project could have a significant effect on the environment, there will not be a significant effect when the mitigation measures described above, or on the attached sheets, have been added to the project. A NEGATIVE DECLARATION WILL BE PREPARED.

☐ The proposed project MAY have a significant effect on the environment and an ENVIRONMENTAL IMPACT REPORT will be prepared.

☐ ENVIRONMENTAL IMPACT REPORT #E.I.R. _____ HAS BEEN PREPARED FOR THIS PROJECT.

James B. Schroeder
Environmental Review Officer
By Mamie Starr Date 3/31/80

NOTICE OF DETERMINATION

LEAD AGENCY: City of Lodi Community Development Department
221 West Pine Street
Lodi, CA 95240

TO: ☑ Secretary for Resources
1416 Ninth Street, Room 1311
Sacramento, CA 95814

FROM: City of Lodi
Community Development Dept.

☑ County Clerk
County of San Joaquin

SUBJECT: Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

PROJECT TITLE: SAFETY/SEISMIC SAFETY ELEMENT /

STATE CLEARINGHOUSE NUMBER: 80033111

The City of Lodi has made the following determinations regarding this project:

1. The project has been ☒ approved by the Lead Agency.
   ☐ disapproved

2. The project ☐ will have a significant effect on the environment.
   ☒ will not

3. ☐ An Environmental Impact Report has been prepared for this project.

4. ☐ A statement of overriding considerations is attached.

5. ☒ A Negative Declaration has been prepared for this project and a copy is attached.

DATE: September 23, 1980